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Corridor Transportation Management for Highway Reconstruction

Southeast Expressway, Massachusetts 1984–1985

May 1986

Prepared for
Massachusetts
Department of
Public Works

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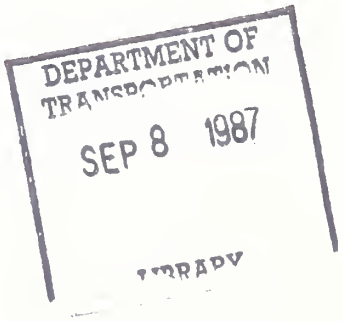
PUBLIC WORKS

Corridor Transportation Management for Highway Reconstruction:

SOUTHEAST EXPRESSWAY, MASSACHUSETTS 1984–1985



Authors

William T. Steffens
Sonia Weinstock
Mary Ellen Sullivan

Date

May, 1986

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Executive Office of Transportation and Construction
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AUTHORS

William T. Steffens · Sonia Weinstock · Mary Ellen Sullivan

GRAPHICS

Janice M. Collen · David B. Lewis

WORD PROCESSING

Sybil White Olga Doherty

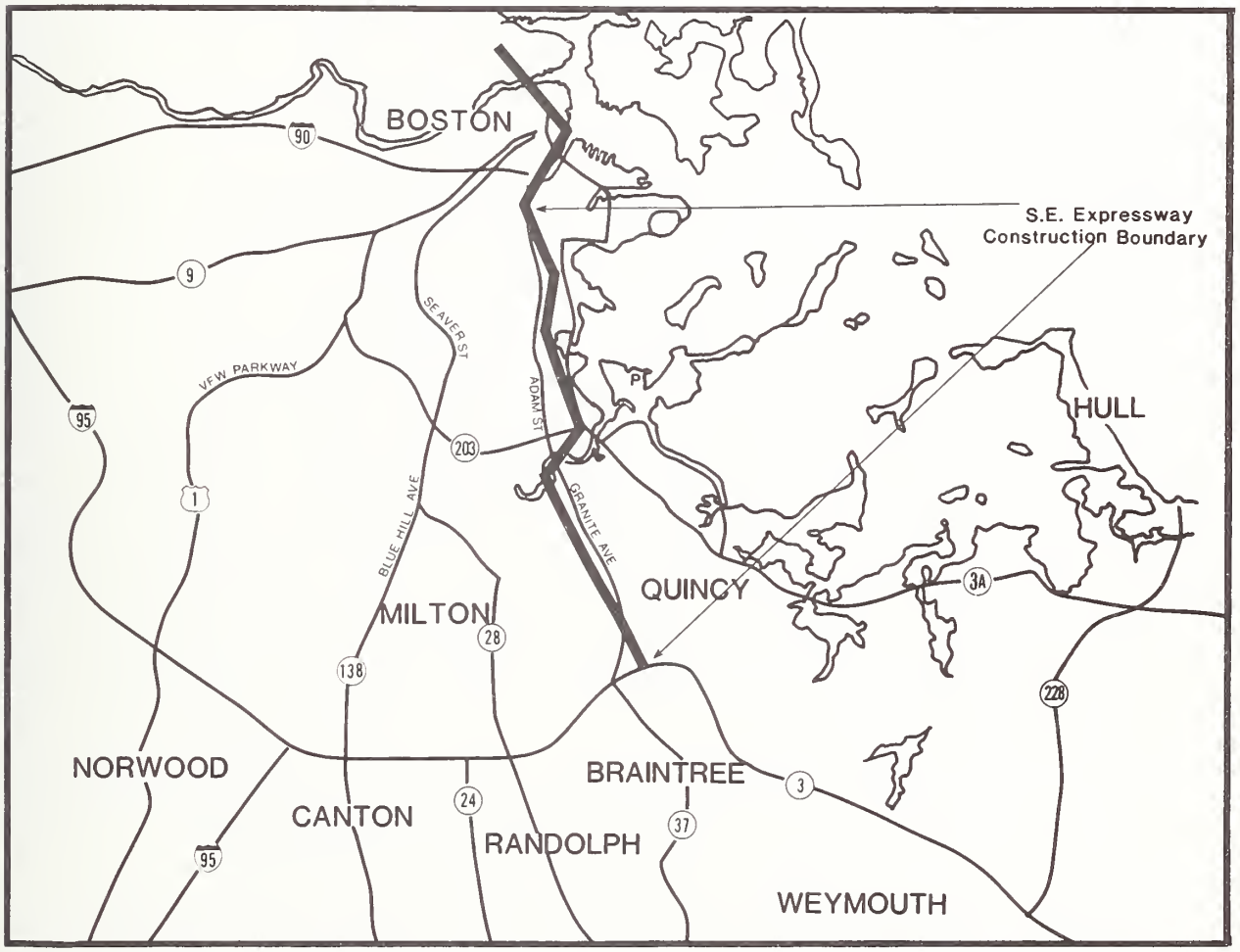

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

PREFACE AND ACKNOWLEDGMENTS

The Massachusetts Department of Public Works began the reconstruction of the Southeast Expressway in March of 1984. To evaluate the impacts of the reconstruction project, an extensive monitoring program was developed, whose results were reported in numerous papers and memoranda. This project documentation formed the basis for this report.

Much of the information in Chapter 2, "The Southeast Expressway Reconstruction Project," first apeared in a paper authored by Dr. Michael D. Meyer, "Planning the Reconstruction of a Major Urban Expressway: The Case of the Southeast Expressway in Boston," Transportation Research Record 1027, 1985. The information on changes in traffic volumes between 1983 and 1984 first appeared in an unpublished memorandum authored by Robert Sievert, "Vehicle Volume Before and During Reconstruction on the Southeast Expressway and Alternative Routes," August 29, 1984. The discussion of changes in travel time between 1983 and 1984 is based in part on an unpublished memorandum authored by Efi Pagitsas, "Analysis of Travel Times on the Southeast Expresway and the Alternative Routes," July 3, 1984.

In Chapter 5, the changes experienced in the use of fringe parking lots between 1983 and 1984 were documented in an unpublished memoranda by Sonia Weinstock, "The MDPW Park-and-Ride Program: Survey of Users and Recent Changes in Facilities Use," July 11, 1984. Rapid transit ridership and parking lot usage change during the first year of reconstruction was discussed in an unpublished memorandum entitled "The Effects of Southeast Expressway Reconstruction on Rapid Transit Ridership in the South Shore Corridor," July 25, 1984, written by Alicia Wilson.

In Chapter 6, discussion of commuter rail patronage and the effect of the reconstruction on ridership between 1983 and 1984 were first documented in two memoranda written by Thomas J. Humphrey, "Analysis of the Results of CTPS Commuter Rail Counts, 3/7/84 and 4/10/84," April 19, 1984 and "Analysis of License Plate Matching for CTPS Commuter Rail Counts, 3/7/84 and 4/10/84," November 26, 1984.

In Chapter 8, commuter boat, carpool and vanpool effectiveness is discussed. Information regarding the first year changes in commuter boat use appeared in an unpublished memorandum authored by Melissa Laube, "Commuter Boat Before and During the Initial Phase of Expressway Reconstruction," May 29, 1984.

Changes in vanpool and auto occupancy following the start of reconstruction were detailed in two unpublished memoranda authored by Robert Sievert, "CARAVAN Vanpool Ridership Between the South Shore and Boston Before and During Southeast Expressway Reconstruction," November 5, 1984 and "Auto Occupancy on the Southeast Expressway Before and During Reconstruction," June 15, 1984.

CHAPTER 1: EXECUTIVE SUMMARY

1.1 INTRODUCTION

Although anticipated as an extremely disruptive project, the reconstruction of Boston's Southeast Expressway when finished was considered by politicians and engineers alike as a model of how to reconstruct a major expressway while maintaining travel in the transportation corridor. The success of this reconstruction effort can be attributed to several factors discussed in this report. These factors included the development of a comprehensive corridor traffic management plan for both construction site and off-site locations, the extensive use of public information and media exposure, the use of flexible mitigation strategies which allowed the responsible agency to adjust the traffic management plan as additional experience was obtained, and the use of a task force to coordinate the numerous agency actions in plan implementation.

The purpose of this report is to describe the corridor traffic management plan used by the Massachusetts Department of Public Works (MDPW) during the reconstruction of the Southeast Expressway. The response of the traveling public to the reconstruction project and to the corridor traffic management plan is also discussed.

1.2 CONTRACTUAL REQUIREMENTS - ROADWAY WORK

A major effort was made to retain as much traffic capacity as possible on the facility itself without causing a major delay in the completion date. The roadway plan involved dividing the road into four, two-lane sections. Lane pairs were separated by Jersey-barriers which extended the length of the project. Two lanes were under construction at all times. Four travel lanes were thus maintained in the peak direction, two in the off-peak direction and the MDPW specified the lowest volume hour as the time for reversing the central lane pair. The central reversible lanes were designated as "express lanes"; truck use was prohibited from these and automobile access was restricted to through traffic by the presence of the continuous (Jersey-type) lane barriers.

This configuration worked remarkably well, in fact, perhaps better than the original roadway pattern which it was replacing. Although considered infeasible for year-round operation, the channelized express lanes produced higher vehicle speeds and

fewer accidents than did the pre-existing facility. Although there were other conditions which were different in the construction phases (e.g., increased police presence and 24-hour tow trucks), it was principally the enhanced vehicle capacity through the construction site which minimized the project's impact on corridor travel.

1.3 PLANNING THE TRAFFIC MANAGEMENT PLAN

A multi-agency task force was created to address the construction-related problems which would result from the disruption caused by the massive project. Critical to this effort was the realization that no single means of transportation would be sufficient to handle the entire shift in travellers, should the capacity of the system be severely curtailed. Furthermore, it was felt that current Expressway users should be provided with many options, rather than being channeled into one or two improved alternate modes. One of the conclusions of the planning task force was that there existed a need for funds to promote transit alternatives and to improve services and options on each mode.

1.3.1 The Transit Package

To follow a strategy of providing as many options as possible to Southeast Expressway users, a multimodal transit alternatives package was developed by the task force. The package consisted of the following:

- Increased commuter rail service.
- Increased commuter boat service.
- Increased private commuter bus service.
- Additional T, BAT and private feeder bus service to Red Line.
- Increased T, BAT and private feeder bus service to commuter rail lines.
- A joint pass program between private bus companies and boat operators.
- Additional police for security on Red Line.

The following summarizes the improvements made to each mode:

Commuter Rail

- 2,100 additional rush hour seats.
- Stoughton Branch doubled peak period frequency.
- Express trains between Boston and Sharon on Attleboro branch.
- Additional peak hour service on Franklin Branch.
- Additional off-peak trains on Framingham Line.

Commuter Boat

- Doubled peak period trip frequency between Hingham and Boston.
- Private boat operations initiated between Squantum and Boston.

Bus Service

- o Additional public/private bus service in 27 communities.
- o 1,200 new one-way trips, mostly on existing routes.
- o New types of coordination between private bus operators, private boat operators and the MBTA (for example, private operators were given the right to sell T (monthly) passes at a 20% discount to their customers).

Park and Ride

- o 1,000 new or leased park and ride spaces were added for vanpool, carpool and bus staging.
- o 500 park and ride spaces were created at commuter rail stations by restriping and expanding current lots at Canton Junction, Readville and Route 128.
- o Additional police were stationed at commuter rail and park and ride lots to handle increased traffic and to provide better security.

1.3.2 Promotion of the Project and Travel Alternatives

Although difficult to quantify, it is generally accepted that the success of the project was due, in large part, to the extensive public information/community relations campaign carried out by the MDPW and each of the transit service providers. The emphasis of the public information effort was to reach all affected communities and to provide them with clear information on the anticipated construction delays and the range of alternatives. The team also served as a community relations task force which received community concerns and negotiated solutions to them. In addition to a variety of promotional responsibilities such as news releases, monthly bulletins, and brochures, two other strategies employed were:

- o A commuter information clearing house was operated through CARAVAN, Inc., a private non-profit organization.
- o A variable work hours program was promoted in downtown Boston.

1.3.3 Non-Traffic Measures

Of importance to the overall success of the project were a number of non-traffic measures which were used to improve the flow of traffic, to provide rapid response to emergencies and to enforce temporary regulations of the construction period.

Police Enforcement

Additional police details were added to provide enforcement and emergency response support. Alternate routes were also

served by added police during peak hours and/or at intersections identified as near capacity.

Emergency Response

To minimize accident response time and reduce the effect which accidents could have on traffic flow, the contractor was required to provide four tow trucks on weekdays and two on Saturday and Sunday. During the week, tow trucks were located at either end of the facility and two at the mid-point. One of the mid-point tows was dedicated to ramp service. Emergency access was provided to the express lanes by a series of gates placed at one-mile intervals.

Screening in the Construction Area

Paddle screens were installed on the side(s) of work areas to prevent motorist distraction. The intention was to eliminate the potential of driver curiosity to disrupt traffic flow and thereby reduce the effectiveness of the traffic management plan. The presence of screens at all work sites eliminated the motorist's expectation of viewing work activities, allowing for complete concentration on driving and, thereby, effectively eliminating the curiosity factor. This worked well in increasing travel speeds and decreasing the probability of accidents.

Local Aid to Communities

In addition to the other mitigating measures, a $500,000 pool was created to be used for aid to local communities especially affected by the reconstruction efforts. The communities were eligible for funding based on their documentation of need.

1.4 PERFORMANCE OF THE TRAFFIC MANAGEMENT PLAN DURING RECONSTRUCTION

1.4.1 Project Site Measures

Between 5,000 and 9,000 vehicles per day were diverted from the Expressway during the first year. Second year volumes were roughly equivalent to pre-reconstruction levels. Peak period volumes, however, increased beyond pre-reconstruction levels in the morning peak direction in each of the two project years. Midday and evening peak volumes declined during the first year, but increased to approximately pre-reconstruction levels during the second year. These findings suggest that the first year reductions in midday and PM peak volumes came about as midday Expressway users chose to avoid the facility. Several observations support this conclusion:

- Work trip travel on the Expressway continued at or above pre-reconstruction levels throughout the reconstruction period.

- Peak period traffic volume changes on alternate routes were consistent between morning and evening periods, indicating that increased use was work trip generated.

- Public transit improvements were generally geared to better peak period service and therefore had little effect on midday general purpose users.

- The public information program discouraged discretionary use of the facility.

- Midday users were confronted with the additional uncertainty of the effects of reversing the express lanes.

- Discretionary trips such as shopping, social, and to a lesser extent medical and personal business, can be satisfied by alternate destinations.

It seems plausible that the reductions in midday and evening peak period-peak direction travel apparent on the facility stemmed from an absence of discretionary midday trips. This discretionary travel, moreover, appears to have been eliminated from the corridor and diverted from downtown Boston to suburban destinations.

Peak period travel times on the Expressway declined during the first year of reconstruction. This improved level of service was due to traffic management methods and not traffic volume reductions. Peak period travel demands increased somewhat as traffic operations through the construction site improved in response to the express lane configuration. Second year travel time increases were found to occur in conjunction with increases in peak period volumes that again approached service volume capacity.

1.4.2 Alternate Routes

Traffic volumes on the alternate routes increased by more than the 9,000 vehicle per day reductions reported on the Expressway. Second year traffic volumes were not monitored; however, recorded changes in travel time provide an indication of traffic levels. During the first year of reconstruction, the TSM-type improvements implemented on the alternate routes provided lower travel times to the higher vehicle levels reported. During the second year no further capacity improvements were made and morning and evening peak period travel times increased, suggesting additional growth in vehicle levels.

1.4.3 Rapid Transit Ridership

Expressway travel conditions seemed to have a direct influence on the changes in rapid transit ridership. During the first year, when Expressway peak conditions were improved, rapid transit

ridership remained fairly constant. Second year deterioration of Expressway levels of service contributed to an average daily ridership increase of 6.8 percent, or a total of 1,700 passengers.

1.4.4 Park and Ride Lot Use

Use of MDPW park and ride lots increased on average by 126 vehicles or 7 percent during the first phase and 175 vehicles or 9 percent during the second phase. This increase was in response to increased capacity and a greater number of bus, carpool, and vanpool opportunities available at the sites. These factors caused a shift to designated sites by users of ad hoc facilities as well as attracting first time users. A survey of commuter parking lot users taken during the first year of reconstruction found that 6.9 percent of the users (50 vehicles) previously used the Expressway, another 4.3 percent (31 vehicles) previously used other lots and 6.5 percent or 47 vehicles previously commuted by other means.

1.4.5 Commuter Boat

The growth in commuter boat ridership (+90 passengers the first year; +300 passengers the second year) was attributed to the following three reasons: significant expansion of services; seasonal variation; and a sizeable latent demand for a high-quality boat service. The negative impact of the reconstruction project did not seem to serve as a major influence on this ridership increase.

1.4.6 Private Bus Boardings

Use of express bus service varied widely in the corridor during reconstruction, but declined slightly overall during the two-year reconstruction period. Reasons for this include:

- Improvements made to other high occupancy modes may have attracted express bus users.

- On certain routes where ridership gains were found following the start of reconstruction some new riders were previously Expressway auto users, and others were attracted from less conveniently scheduled bus services.

- Daily and seasonal variations contributed to the mixed results.

- The single day ridership survey initially made may have been insufficient for evaluating "before" and "during" comparisons due to the fluctuations in ridership that occur daily.

1.4.7 Commuter Rail Service

Improvements to commuter rail service at a two-year project cost of $3.6 million were the second most expensive aspect of the

corridor management plan. First-year surveys found that the improvements made on four lines netted the system close to 370 riders per day. Second-year estimates of new riders were higher at 420 per day.

Ninety percent of those influenced by the reconstruction to switch to commuter rail indicated the switch necessitated a change in commuting schedule to use the service; and close to 95 percent of these indicated long-term intentions to continue using the service.

1.4.8 Ridesharing

The response to an aggressive vanpool and carpool marketing strategy was disappointing. Expressway automobile occupancy during the reconstruction project declined.

1.5 PROGRAM COSTS

The contract required the contractor to provide at a minimum:

- Police patrols and traffic details,
- 24-hour tow truck service,
- Communications center,
- Operation of the reversible lane configuration through positioning and repositioning temporary median barriers,
- Barrier screens at work sites,
- Impact attenuation devices, and
- Participation in an incentive/disincentive clause.

Expenditures on these items reached $10.2 million, due primarily to higher than anticipated enforcement costs. Notably, the incentive/disincentive clause had an insignificant impact on the contract amount and the work was finished on schedule.

Other related costs were incurred in addition to the contract for off-site mitigation measures, including:

- o Fringe Parking
- o Vanpooling
- o Alternate Routes and Enforcement
- o Public Information
- o Aid to Affected Communities
- o MBTA Commuter Rail
- o MBTA Private Bus Service
- o MBTA Commuter Boat
- o MBTA Red Line and Feeder Bus Service
- o BAT Feeder Bus Service

The cost of these provisions totalled $8.3 million. Cost savings were possible through cutbacks in unessential services after the first three month evalution period. The Federal Highway Administration provided funding for vanpooling, alternate route improvements public information, commuter rail, and one express bus service.

1.6 RECOMMENDED STRATEGY

This project illustrated several important characteristics of a successful strategy to minimize disruption during major reconstruction projects. The responsible agency must clearly identify objectives, strategies, and implementation policies which are realistic and satisfactory to the agency and communities involved. The plan must be flexible in its implementation to allow the removal of ineffective actions in a timely manner. In addition, an institutional mechanism for coordinating the actions of numerous agencies must be established. With regard to information, a program of data collection is needed to provide the information necessary to modify strategies and to answer questions that will surely arise from affected communities and the media. Perhaps most importantly, a comprehensive community relations/media program is essential to the success of any program to minimize disruption.

With regard to the success of individual plan elements, this project showed that concern for traffic flow through the construction site should be a primary element of pre-project planning. The use of the reversible lanes during the peak hours was an effective means of minimizing travel disruption. These lanes, along with effective signing, towing, and public information, were critical to the success of the project. The most cost-effective off-site actions were the improvements made to the alternate routes, including traffic signals, pavement markings, and police presence. Less effective, and yet considered important to the overall strategy of providing options to Expressway users, were the improvements to public transportation and the park and ride lots. These latter actions, however, represent permanent improvements to the corridor transportation system which will exist long after the reconstruction project is ended.

Perhaps the most important lesson learned from the Southeast Expressway reconstruction experience is that, even with the tradeoff of potentially delaying project completion, an effective corridor traffic management program is critical to the success of large-scale reconstruction efforts.

2. The Southeast Expressway Reconstruction Project

CHAPTER 2: THE SOUTHEAST EXPRESSWAY RECONSTRUCTION PROJECT

2.1 INTRODUCTION

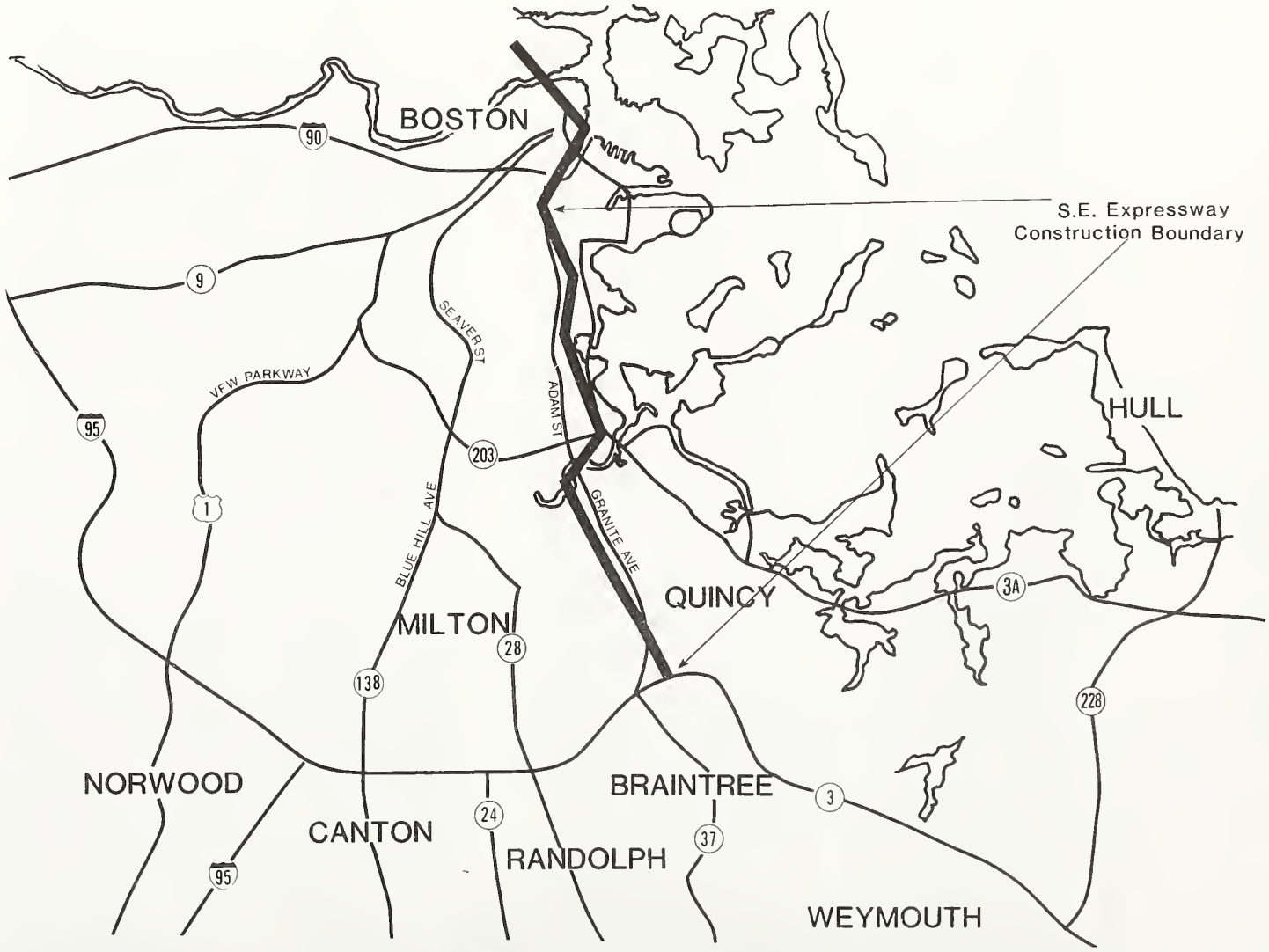
Large-scale highway reconstruction has become an important challenge to planning and engineering professionals. Interest is particularly keen in urban areas where Interstate sections operate at or near capacity for some portion of the day. Because of the important political and economic repercussions of large-scale disruption of travel behavior, transportation agencies facing major reconstruction projects need to examine seriously alternative means of minimizing this disruption.

This report presents a case study of the reconstruction of the Southeast Expressway in Boston, Massachusetts. As the agency responsible for the construction and maintenance of the state highway system in Massachusetts, the Massachusetts Department of Public Works (MDPW) developed and implemented a traffic management plan designed to provide users with acceptable levels of mobility within the project corridor. This report evaluates each of the components of the plan and assesses the plan's effectiveness in minimizing the disruption to users, while mitigating adverse impacts on surrounding communities.

2.2 CONTEXT

The Southeast Expressway is a six-lane, 8.3 mile segment of Interstate highway (I-93) which extends from Boston south to Route 128 (see Figure 2-1). The Expressway provides the only major highway link to the rapidly developing southeastern regions of Massachusetts. The facility was designed and constructed in the late 1950s to carry an estimated 75,000 vehicles per day. In 1983, the MDPW reported that the Expressway had surpassed 160,000 vehicles in daily volume. On an average weekday, morning peak period traffic between 6:00 and 9:00 AM reached 29,000 vehicles, with 19,000 or 66 percent northbound and 10,000 or 34 percent southbound. Evening volumes peaked at a slightly higher 32,000 vehicle average between 3:00 and 6:00 PM, but with a less pronounced directional split of 20,000 or 62 percent southbound and 12,000 or 38 percent northbound. Truck and bus traffic for the same time periods averaged 6.3 percent of the total during the morning and 4.3 percent in evening.

By the first year of reconstruction (1984), the Expressway had been in operation for 25 years. Each of the Expressway's 15 bridge decks had reached critical stages of deterioration



SOUTHEAST EXPRESSWAY
RECONSTRUCTION PROJECT BOUNDARIES

CTPS

FIGURE
2-1

requiring complete reconstruction to correct. Because of the extensive nature of the bridge rehabilitation work, and the likely large-scale disruption it would cause, the MDPW decided to make a number of other improvements which would not substantially add to the disruptive impact of the bridge repair project. The reconstruction project involved a $65 million contract including: rehabilitation of 15 bridges; resurfacing the entire 8.3 miles of the Expressway, improved vehicle access/egress at ramps through widening and lengthening merge sections; the addition of emergency turnouts for improved safety; the conversion of break-down lanes into permanent traffic management lanes which could be used by traffic during peak periods; the provision of new overhead lights; the development of a new drainage system; and the provision of a new highway signing scheme. The reconstruction was scheduled to take place over two years with actual work permitted between the months of March and November in 1984 and 1985.

Because the Expressway reconstruction project was viewed by many as potentially quite disruptive, the MDPW, almost one year before reconstruction was to start, began a planning effort to develop an overall corridor traffic management plan. This effort included actions that needed to be implemented on the construction site by the contractor, and off-site actions that required coordinated effort by numerous agencies. A task force was established which included representatives from the planning, design, and construction divisions of the MDPW; representatives from other state agencies such as the transit authority, state police, and port authority; local community officials; and public relations personnel. The task force met monthly to coordinate the numerous activities leading up to the successful implementation of the corridor traffic managment plan.

Four months before the reconstruction was to begin, the state legislature passed a resolution requiring the MDPW to submit such a plan for its review. To help implement the plan, the legislature provided $2.0 million to fund any action included in the plan. In the end, almost $10 million was spent by the MDPW on actions in the corridor traffic management plan.

2.3 CONTRACT REQUIREMENTS DESIGNED TO MINIMIZE DISRUPTION

Due to high levels of traffic volume on the Expressway at all hours of the day, a decision was made to provide as much traffic capacity as possible through the construction site. The Expressway was divided into four, two-lane sections. Lane pairs were separated by Jersey-barriers which extended the length of the project. Two lanes were under construction at all times. As work was completed on a two-lane section it was opened and the adjacent section was shut-down for work. It was anticipated that the northbound lanes would be completed in the first construction season, and the southbound lanes would be completed in the second year.

The contract required the contractor to provide four travel lanes in the peak direction during peak hours, and two lanes in the off-peak direction. The four-lane peak hour configuration was accomplished by turning the middle pair of lanes which were not under construction into reversible lanes. In the morning rush hour, the direction of these lanes was northbound into Boston. In the afternoon, the direction of these lanes was switched to the southbound direction to serve evening rush hour traffic leaving Boston. The contract specified the lowest volume hour as the time for reversing the central lane pair. In this manner, an equivalent level of peak direction capacity was available in the peak direction during construction as was available before the construction project. Four northbound lanes were available between 5:30 AM and noon and four southbound lanes were in operation between 1:00 PM and 10:00 PM.

The construction period lane configuration for Phase 1 is displayed in Figure 2-2. The central reversible lanes were designated as "express lanes." Truck use was prohibited from these lanes and automobile access was restricted to through traffic by the presence of continuous lane barriers. That is, once a vehicle entered this reversible lane section, the only exit was eight miles away. To permit emergency vehicle access to this express lane section, gates were provided in the Jersey-barrier every mile. During the months when there was no reconstruction activity (December - February), the Expressway was returned to its ordinary six-lane, two breakdown lane cross-section.

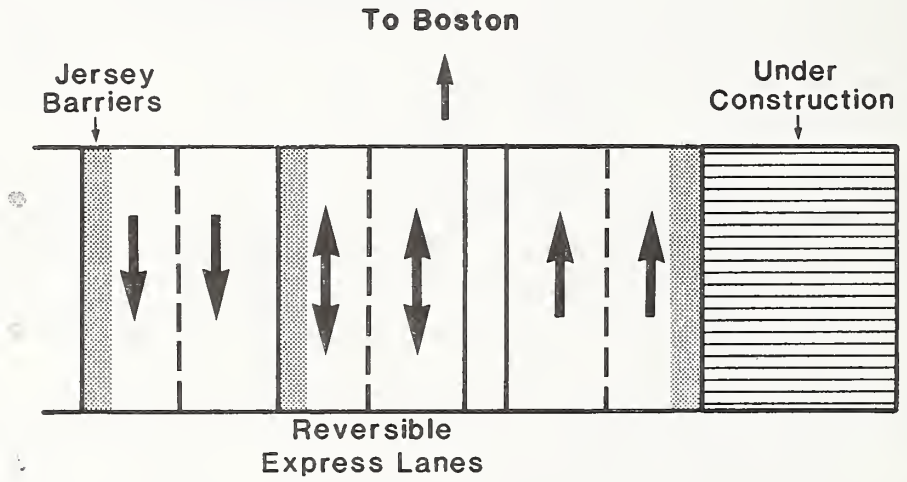


Figure 2-2 Lane Configuration During Phase 1 of Reconstruction

Other contractual requirements included: a 24-hour provision of four tow trucks, the use of paddle-type glare screens at work areas to prevent motorist distraction; 24-hour police details for enforcement and emergencies, the provision of advance signing to warn motorists of the traffic management scheme; and the establishment of a project site communications center to

coordinate activities. In addition, the contract contained a completion date incentive/disincentive clause of $10,000 per day. The incentive/disincentive clause would pay the contractor $10,000 per day for each day ahead of schedule the work was completed, and would charge the contractor the same amount for each day work continued beyond the deadline.

It is important to note that some of these contract requirements (e.g., maintaining six lanes of traffic during rush hours) impacted the scheduling of construction activities. The tradeoff of maintaining acceptable traffic flow through the construction site is often extending the completion date of the construction project. Because of these tradeoffs, the participation of the construction staff in preparing the traffic managment plan was considered essential.

2.4 A CORRIDOR TRAFFIC MANAGEMENT PLAN

In addition to the traffic management schemes implemented on the construction site itself, the MDPW developed a traffic management plan for travel in the Expressway corridor. Although many studies were undertaken during project planning to determine how users would likely respond to reconstruction (see appendix A), the MDPW strategy was to provide as many travel options as possible to Expressway users. In addition, these options would be promoted through an aggressive public information program. Actions to be implemented were selected according to:

- The degree to which the action would provide opportunities for Expressway users to use alternative modes, routes, or times.
- The feasibility of implementation within the time span before reconstruction.
- The cost-effectiveness from the point of view of the action's contribution to minimizing disruption per dollar expended.
- The contribution of the action to more permanent transportation improvements after the reconstruction was completed.
- The flexibility of removing the action found not to be effective.

The corridor plan concentrated improvements in the following areas:

Park and Ride Lots: The MDPW is responsible for the park and ride program in Massachusetts. In this capacity, the MDPW had already constructed several lots (1600 spaces) throughout southeastern Massachusetts which could provide some staging areas for carpools, vanpools, and transit. Because of the reconstruction project, however, the MDPW expanded two existing lots, built

three more, and leased space for a sixth, adding a total of 1,000 spaces to the park and ride capacity that could serve the Expressway corridor. Some 500 spaces were added at commuter rail staions by restriping and expansion of existing lots.

Ridesharing: CARAVAN, a private, non-profit corporation had been established in 1978 to organize long-distance commuter vanpools as an alternative to the automobile. By 1983, CARAVAN served more than 1800 commuters in 135 vans throughout the state. Because of the reconstruction project, CARAVAN was asked to establish an employer-based ridesharing program and create an information brokerage program which would be the focal point for all information on transportation options in the Boston metropolitan region. Boston commuters were able to call one phone number to obtain information on public and private bus services, commuter rail services, commuter boat operations, ridesharing options, and park and ride locations.

Alternate Routes: Experience from other cities which faced reconstruction projects indicated that one of the predominant means of commuter response is to find alternate highway routes to the destination. In anticipation of such behavior, the MDPW identified four major routes that would likely serve as diversion routes, and located key congestion points along these routes. Working with local officials, the MDPW made signal and pavement marking improvements at 29 intersections.

Mass Transit: The Expressway corridor was served by several mass transit modes. Unfortunately, the subway line serving the corridor was already at capacity during rush hours and the major commuter rail line experienced ridership at 140 percent of seated capacity on several peak hour departures. The mass transit component of this program therefore focused on adding temporary capacity to the fixed rail system and on implementing new bus services. By doubling rail departures on the southern commuter rail lines, an additional 2100 passenger seats were available to commuters. The public transit agency (the Massachusetts Bay Transportation Authority, the MBTA) also made agreements with eight private bus operators to provide express bus service from key communities in southeastern Massachusetts. A total of 30 buses were added to peak hour service. In addition, two new commuter boats were subsidized for operation from a town ten miles south of Boston.

Variable Work Hours/Flextime: Another way commuters could adapt to the reconstruction project was to change their departure time to avoid major delays. The MDPW, in cooperation with the MBTA and the Boston Chamber of Commerce, sponsored a major conference to encourage large employers to implement a variable work hours or flex-time program.

Police Enforcement: Officials from communities adjacent to the Expressway expressed great concern that traffic diverted from

the Expressway would create serious congestion and safety problems in local neighborhoods. The MDPW, in cooperation with local police agencies, identified numerous intersections where police enforcement of traffic regulations and directing of traffic might be necessary. A multi-phased strategy of placing police at 68 intersections during the first two weeks, at 31 intersections for the subsequent three weeks, and then at those intersections where clear problems existed, was agreed to by state and local police authorities.

Public Information/Community Liaison: A critical component of the corridor management plan was to make available to the public as much information on the alternatives as was possible. Three independent consultants were hired to lead the public information effort. This effort included radio and television ads., the production of public information materials, newsletters, slide shows, and holding over 200 meetings. Utility companies voluntarily published 100,000 brochures on the project and enclosed them with monthly billings. One major corporation produced a video tape on the project to be shown to its employees and to be loaned to any other interested corporation.

Aid to Affected Communities: Recognizing that the reconstruction could have considerable impact on local communities, the MDPW set aside a sum of $500,000 to fund mitigating projects originated at the community level. Communities generally responded with proposals to add police, fire and emergency personnel in areas where Expressway traffic overflow might otherwise hinder emergency response.

In the chapters that follow, each of the corridor traffic management measures are described and evaluated in detail. In large part, the analysis focuses on the changes brought about by the reconstruction project through a comparison of "before" and "during" conditions. The findings and conclusions of each chapter are compiled to form an overview of the reconstruction impacts in the final "Summary" chapter.

3. Reconstruction Impact on Traffic Volume and Travel Time

CHAPTER 3: RECONSTRUCTION IMPACT ON TRAFFIC VOLUMES AND TRAVEL TIMES

3.1 TRAFFIC VOLUMES

3.1.1 Introduction

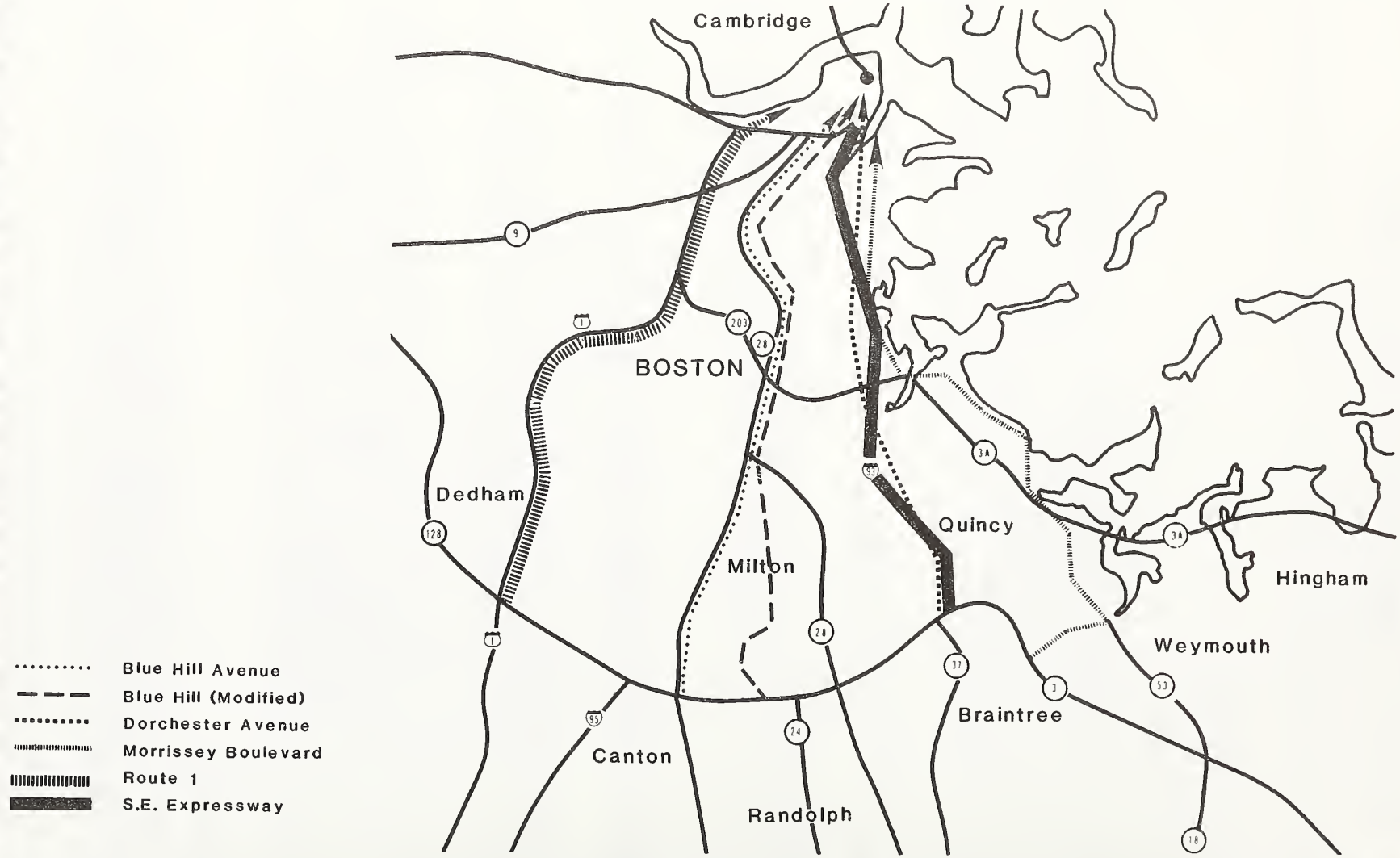
Because of the Expressway's key role in transporting people and goods in southeastern Massachusetts, the reconstruction project was likely to have a major impact on drivers' behavior. In order to identify the magnitude of this impact, a traffic counting program was implemented at numerous locations on the Expressway and on alternate routes. The primary alternate routes as defined by MDPW engineers were the following north-south roadways from downtown Boston to Rte. 128 (see Figure 3-1):

- o Rte. 1, from Storrow Drive via the Jamaicaway and VFW Parkway, through West Roxbury and Dedham.
- o Blue Hill Avenue, via Rte. 28 (Columbus Avenue, Seaver Street) and Rte. 138. A modified version of this route involves Blue Hills Parkway and Unquity Road instead of Blue Hill Avenue, south of Mattapan in the Milton section of the route.
- o Dorchester Avenue, through South Boston and northern Dorchester, then via Adams Street in Dorchester, and Granite Avenue and Willard Street in Milton and Quincy.
- o Morrissey Boulevard, via Summer Street, L Street, Day Boulevard, and Morrissey Boulevard in South Boston and Dorchester, then via Quincy Shore Drive and Sea Street to the Southern Artery (Rte. 3A) in Quincy.

In addition to these four alternate routes, traffic volumes on the Massachusetts Turnpike (as reported from daily interchange volumes) were also examined. The MDPW took counts on some additional, slightly less important, routes as well. These were Washington Street (Boston-Dedham), Hyde Park Avenue (Boston), Central Avenue (Boston-Milton), and (lower) Dorchester Avenue (Boston-Milton).

3.1.2 Procedure

In order to get a more uniform comparison of "before" and "during" data, "before" counts were seasonally adjusted to May 1, 1983. All "during" data were based on counts taken in late April



DESIGNATED ALTERNATE ROUTES TO THE SOUTHEAST EXPRESSWAY

CTPS

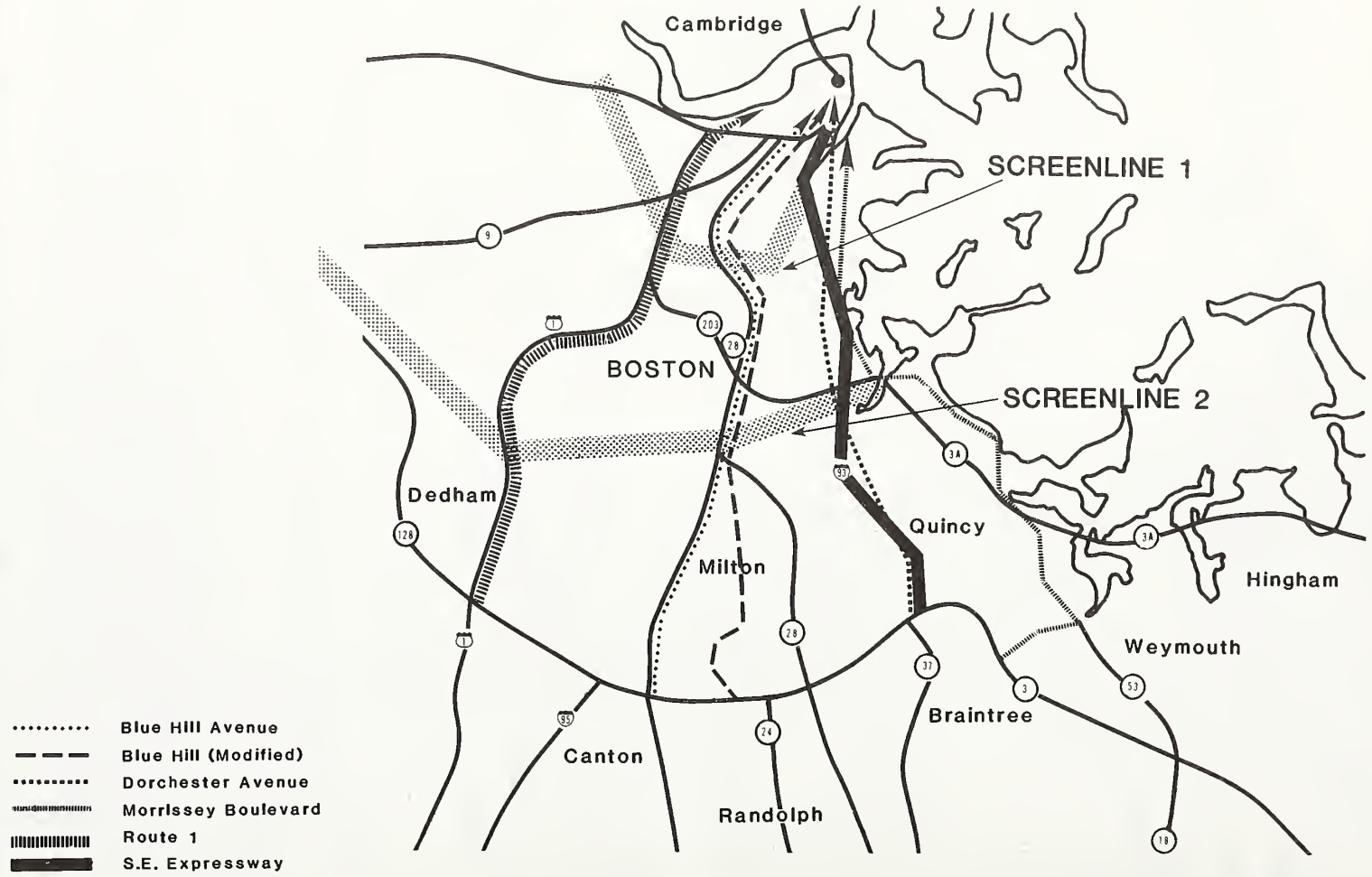
FIGURE 3-1

and early May, 1984 to provide a comparison of "before" and "during" conditions. The methods of seasonally adjusting the "before" data are found in appendix B.

Traffic on the alternate routes was counted at two screenlines which also crossed the Expressway. These two screenlines (see Figure 3-2) involve the following "northern" and "southern" locations (Screenlines 1 and 2, respectively):

Route	Screenline 1	Screenline 2
Southeast Expressway	@ Southampton St.	@ Neponset River
Designated Alternative Routes:		
Mass Turnpike	@ Allston: exits 19 & 20	@ Rte. 128: exit 15, and through traffic
Rte. 1	North of Perkins St.	Boston - Dedham line
Blue Hill Avenue	Columbus Ave., south of Washington St.	Mattapan: south of River St.
Dorchester Avenue	South of Preble St.	Granite Ave.: @ Neponset River
Morrissey Boulevard	L St., north of Day Blvd.	@ Neponset River
Additional Alternative Routes:		
Washington Street	-	Boston-Dedham line
Hyde Park Avenue	-	North of Metropolitan Ave.
Central Avenue	-	Boston-Milton line
Dorchester Avenue (lower)	-	Boston-Milton line

As shown in Figure 3-2, Screenline 1 consists of six count locations, one on the Expressway and the five designated alternate routes, ranging from 2 to 5 miles from downtown Boston. There were numerous streets which crossed this screenline whose traffic levels were not monitored. This was even more true for



ALTERNATE ROUTES AND SCREENLINE LOCATIONS

CTPS

FIGURE 3-2

Screenline 2 (particularly west of Rte. 1) which connected ten count locations.

The data for Screenline 2 were collected by the MDPW with continuous machine counting from mid-March 1984. The data for Screenline 1 were gathered from 48-hour tube counts and one-day manual counts taken before and during reconstruction periods. Because the "before" counts along Screenline 2 were taken so close to the beginning of reconstruction, an attempt was made to compare these data with pre-1984 counts from the same locations to confirm the accuracy of the newer data. This was necessary to ensure that the "before" counts were not influenced by changes in travel patterns which may have occurred before the official start of reconstruction.

3.1.3 Analysis

Table 3.1 lists the actual and adjusted 13-hour traffic volumes for the Southeast Expressway at both screenlines, by direction, from approximately May 1, 1983 ("before") and May 1, 1984 and 1985.

Table 3.1

Traffic Volumes at Two Screenlines
Before and During Southeast Expressway Reconstruction
(6AM - 7PM)

Southeast Expressway

	Before	During	Change	Percent
		Screenline 1		
NB 1983-1984	63,200	57,000	-6,200	-9.8
SB 1983-1984	59,950	56,800	-3,150	-5.3
NB 1983-1985	63,200	64,350	+1,150	+1.8
SB 1983-1985	59,950	59,000	- 950	-1.6
		Screenline 2		
NB 1983-1984	50,650	46,050	-4,600	-9.1
SB 1983-1984	46,750	46,600	- 150	-0.3
NB 1983-1985	50,650	44,450	-6,200	-12.2
SB 1983-1985	46,750	47,200	+ 450	+1.0

The traffic volumes listed represent conditions between the hours of 6 AM and 7 PM during late April and early May for 1983, 1984, and 1985. During 1984 and 1985, reconstruction would have been underway for approximately two months at the time the counts were taken. At the Southampton Street location (Screenline 1, at the Boston end of the project), total traffic declined by 6,200

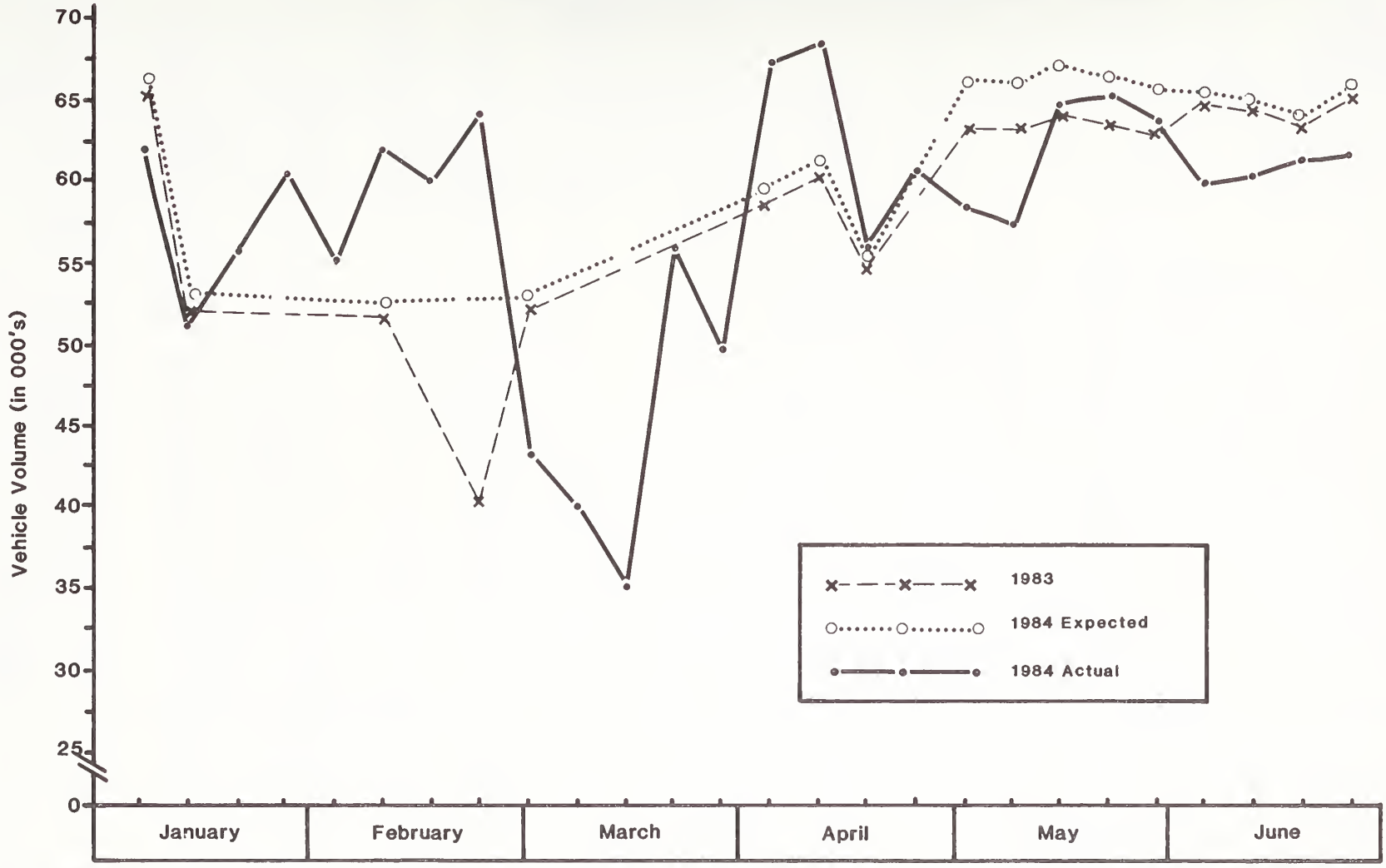
(northbound) and 3,150 (southbound) between 1983 and 1984. The general decline in volume is evidence of the impact of the reconstruction project in diverting traffic from the Expressway. A similar response is reflected in the volumes reported at Neponset Circle (Screenline 2, located approximately midway through the project), although the difference in southbound volume is less substantial. The results at both screenlines become even more significant when potential/expected traffic volume growth is considered. The Expressway volumes had been increasing at an annual rate of 4 to 5 percent between 1979 and 1983.

A comparison of the 1983 and 1985 volumes indicates that some of the originally diverted traffic returned to the Expressway during the second year of reconstruction. The exception to this general trend is the Screenline 2, northbound volume. Table 3.1 suggests that northbound volumes should be nearly equal to or slightly higher than southbound totals. The fact that the reported 1985 Neponset Circle volumes do not reflect this raises questions about the validity of the data. Moreover, the relative parity between 1983 and 1985 reported volumes elsewhere in Table 3.1 indicates the northbound, 1985 Neponset Circle reported volume is unreliable. Discounting the reported volume, it is possible to conclude that Expressway traffic volumes returned to and in some instances exceeded 1983 levels during the second year of reconstruction.

It is likely that several factors contributed to this relatively large single year increase in traffic. Important among these was the reduction in Expressway travel times experienced during the first year following introduction of the reversible lane configuration. The reconstruction configuration resulted in an increase in peak direction capacity evidenced by the increased volumes of peak traffic volumes. Analysis of pre-reconstruction conditions had shown the facility to be carrying capacity loads in the peak direction. The increase in service volume during reconstruction can be attributed to the separation of the long distance travelers from the ramp traffic. Historically, the traffic entering/leaving the Expressway at interchanges caused all peak direction lanes to be congested because of merge and weave problems. The Jersey-barriers separated this traffic and thus provided vehicles coming from Route 128 an express lane to downtown Boston. Other factors which contributed to the second year volume growth included a general reduction in media attention to the public transit alternatives.

Figures 3-3 (northbound) and 3-4 (southbound) show on a weekly basis the trend in average weekday[1] traffic (<u>actual</u>) be-

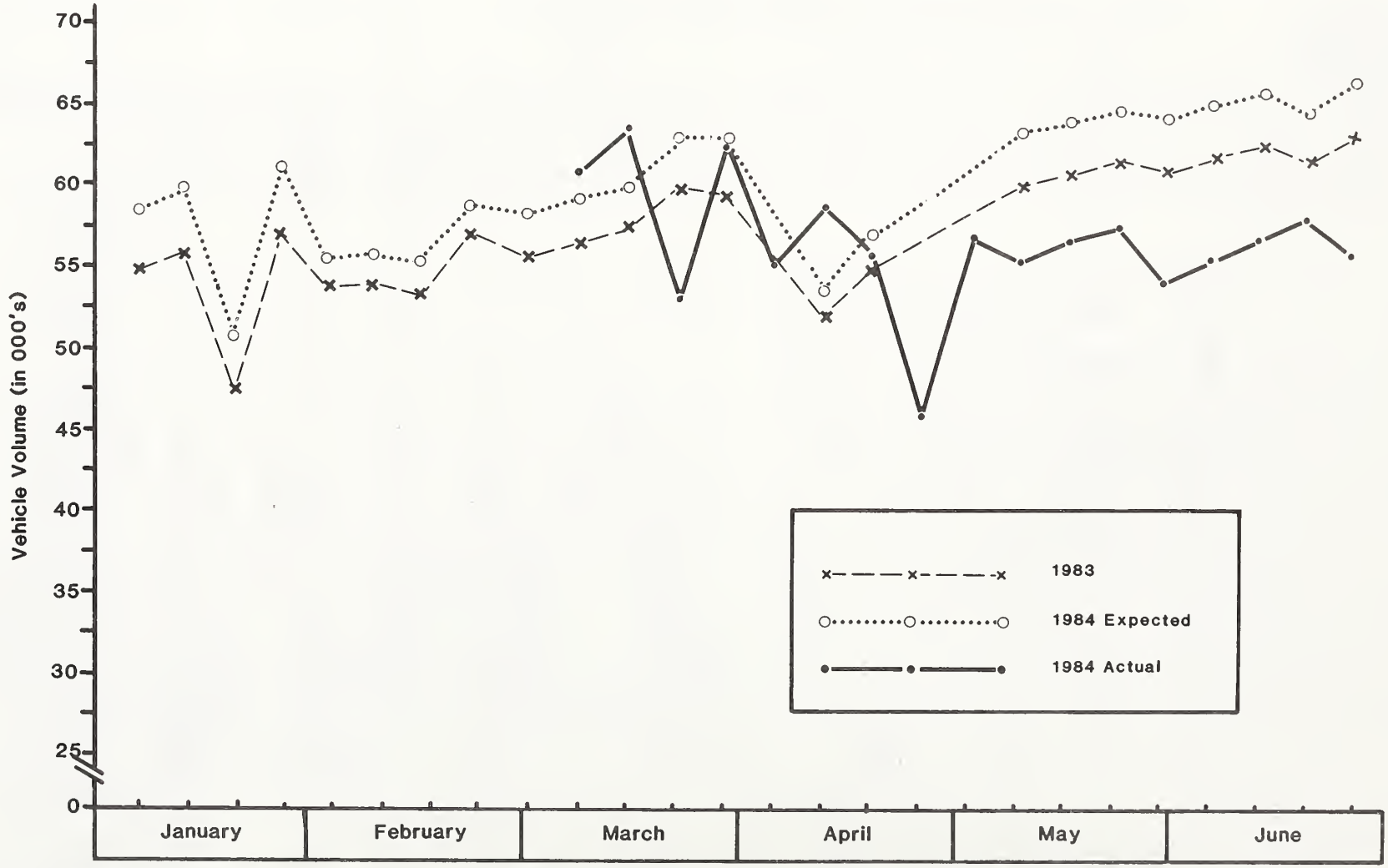
[1]Averages of Tuesdays, Wednesdays, and Thursdays. Volumes between January and March (northbound only) were from the permanent count station #81 at Southampton Street; subsequent counts, other than the early May data mentioned above, were tube counts (which were multiplied by 1.1 to conform with expected manual count levels).



AVERAGE DAILY (6AM-7PM) TRAFFIC VOLUMES
SOUTHEAST EXPRESSWAY AT SOUTHAMPTON STREET
NORTHBOUND, 1983-1984

CTPS

FIGURE
3-3



AVERAGE DAILY (6AM-7PM) TRAFFIC VOLUMES
SOUTHEAST EXPRESSWAY AT SOUTHAMPTON STREET
SOUTHBOUND, 1983-1984

CTPS

FIGURE 3-4

tween January and June for both 1983 and 1984. Additionally, expected 1981 traffic (that is, the traffic that would have occurred without the reconstruction project) is displayed, based on average monthly growth factors between 1980-1983.

In sum, the volume graphs show the following:

Northbound:

- o Traffic volumes during the early part of 1984 were higher than expected.
- o Traffic volumes decreased dramatically during early March, 1984.
- o Traffic volumes increased to, and above, expected levels during late March and through much of April.
- o From late April through June, traffic remained near, but below, expected values.
- o The early May (manual count) comparisons show that instead of an expected increase of about 4.3%[2], a decrease of almost 10% (6,200 vehicles) was reported.
- o The slight increase during May and June could be a combination of some former Expressway drivers returning, and normal seasonal growth.

Southbound:

- o Traffic volumes between January and early March of 1984 were not available.
- o After a dip in traffic volumes around the beginning of reconstruction (March 19) traffic returned to expected levels until the middle of April.
- o Between late April and June, traffic remained below expected levels.
- o A comparison of the manual counts in early May show that instead of an expected increase of about 5.4%[3], a decrease of over 5% (3,150 vehicles) took place.
- o The slight increase during May and June could be a combination of some former Expressway drivers returning and normal seasonal growth.

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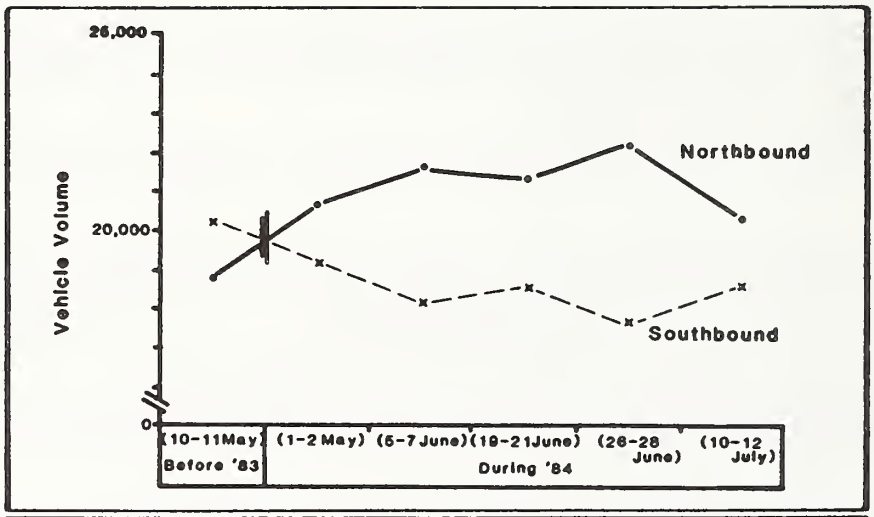
[2]Based on average yearly increases in May AWDT (northbound) between 1979-1983 at Southampton Street.

[3]Based on average yearly increases in May AWDT (southbound) between 1979-1983 at Southampton Street.

An analysis of the hourly breakdown of these volumes shows that the decrease occurred only partially during peak periods. Table 3.2 and Figure 3-5 show peak period volumes before and during reconstruction (6-9 AM northbound, and 3-6 PM southbound).

As shown in Table 3.2 peak period traffic volumes generally increased between the first and second year of reconstruction. However, from the perspective of "before" and "during" reconstruction, northbound peak period traffic increased during reconstruction while southbound peak period volumes declined. The finding holds for both count locations (Southampton and Neponset) as the relationship between the two locations is consistent during the peak period. For simplicity sake, the discussion of volume changes will center on the Southampton Street (Screenline 1) location.

Turning first to the northbound direction, the increases in vehicle volume are directly attributable to the additional capacity provided by the reversible lane configuration. Figure 3-5 shows that peak period traffic declined only in the southbound direction. In fact, the northbound direction shows a 9% increase in peak period traffic between May 1983 and 1984. The southbound direction showed a 6% decrease. Combined, there was a net increase in peak period, peak direction traffic of nearly 2%, or 600 vehicles. This implies, therefore, that the bulk of the decrease in Expressway traffic had taken place during the off-peak hours, or in the peak period, off-peak direction. This, in fact, is not a surprising conclusion because it was during these periods and in this direction that only two lanes were available on the Expressway.



TRAFFIC COUNTS BEFORE AND DURING RECONSTRUCTION ON THE SOUTHEAST EXPRESSWAY AT SOUTHAMPTON STREET (6-9 AM, NB; 3-6 PM, SB)

CTPS FIGURE 3-5

(Screenline 1)
Southeast Expressway at Southampton Street
(6-9 AM, NB; 3-6 PM, SB)

Before (1983)	During (1984)	During 1985
May 10-11	May 1-2	May 7-8
(NB) 18,850	(NB) 20,600	22,650
(SB) 20,250	(SB) 19,100	19,800
	June 5-7	June 4-6
	(NB) 21,550	19,100
	(SB) 18,100	19,200
	June 19-21	June 11-13
	(NB) 21,300	23,200
	(SB) 18,550	18,500
	June 26-28	
	(NB) 22,100	
	(SB) 17,650	
	July 10-12	July 9-11
	(NB) 20,300	20,900
	(SB) 18,500	19,250

(Screenline 2)
Southeast Expressway at Neponset
(6-9 AM, NB; 3-6 PM, SB)

Before (1983)	During (1984)	During (1985)
April	April-May	April
(NB) 17,350	17,500	18,450
(SB) 18,000	16,950	17,450
	June 5-7	June 4-6
	(NB) 17,750	18,150
	(SB) 15,300	
		June 11-12
	(NB)	22,100
	(SB)	
	June 26-28	July 9-11
	(NB) 17,800	18,000
	(SB) 15,550	16,900

PEAK PERIOD TRAFFIC COUNTS
BEFORE AND DURING RECONSTRUCTION

CTPS
TABLE
3.2

Figure 3-6 compares directional volume peaking characteristics on the Expressway before and during reconstruction. The graph shows that during reconstruction, AM peak period, northbound traffic was generally higher during the three peak hours between 6:00 AM and 9:00 AM than for the same time period of the previous year. The fact that northbound volumes in the hour following the peak, 9:00 AM to 10:00 AM, were slightly lower during reconstruction, caused a sharper AM peak to appear. The most plausible explanation for this change was again the increase in the peak direction service volume rate under the express lane/local lane configuration which lessened the time necessary to serve the AM peak period work trip commuter traffic.

Although volumes were substantially lower during the southbound PM peak direction once reconstruction began, the general peaking characteristics were similar to those discussed above. This is indicative of the continued presence of work trips and a reduction in discretionary travel.

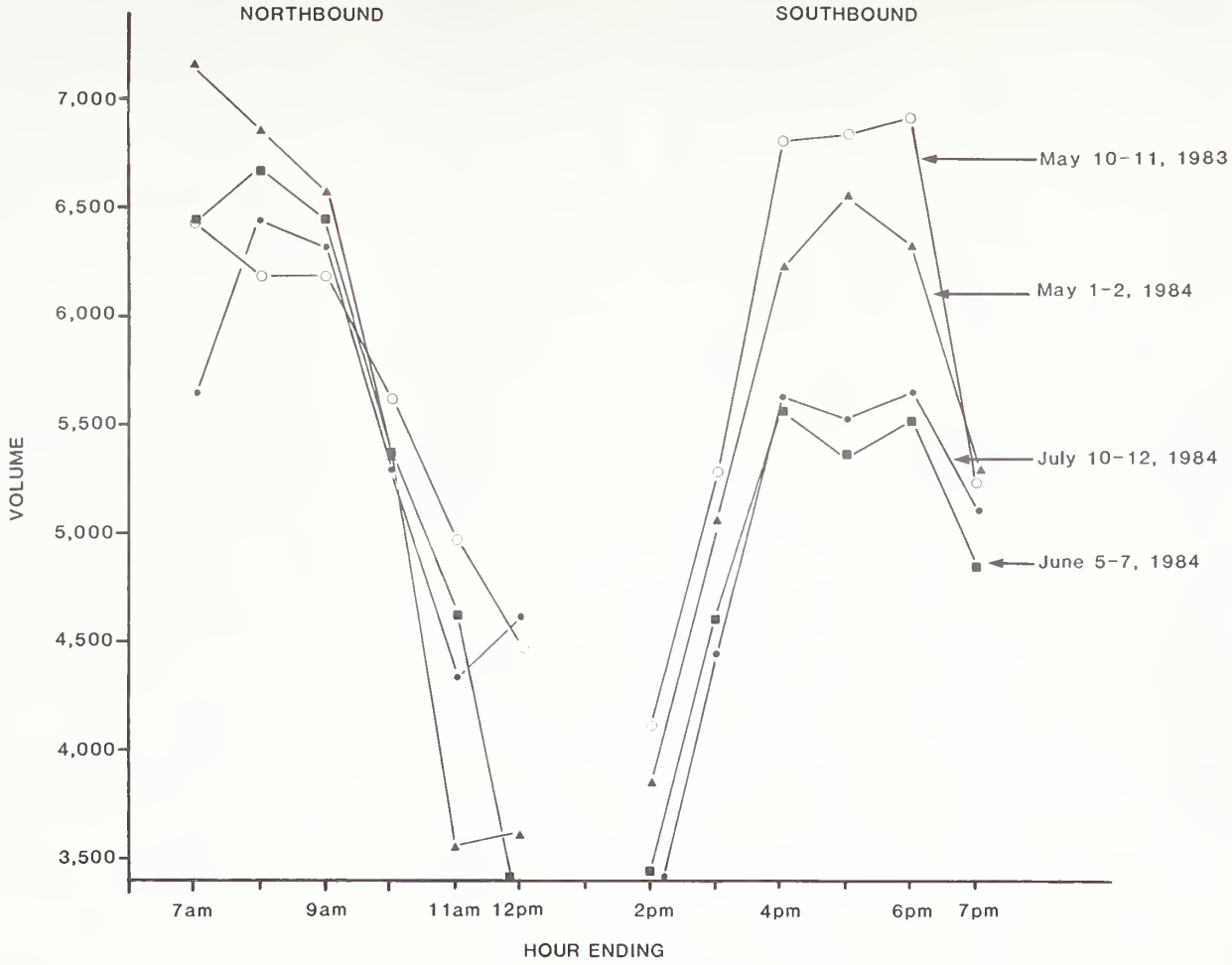
As discussed earlier, weekday traffic volume experienced a net decline over the 6:00 AM - 7:00 PM thirteen hour period. The source of the reduction was the mid-day, off-peak and southbound, peak period traffic. It appears that promotional efforts were successful in either eliminating or diverting a portion of mid-day discretionary travel such as shopping and recreational trips. The absence of these trips from the mid-day flows also led to a decline in evening volumes due to the absence of return trips. The evening commute traditionally consists of a more diverse mix of trip purposes, generally including the work trip as well as a percentage of shopping, social and other discretionary trip types. The fact that a number of these trips were eliminated from the facility during the mid-day caused return trip reductions that were reflected in the decline of evening peak direction traffic (southbound).

One of the major impacts of the reconstruction project was thus on mid-day travel. Mid-day users found many fewer new choices than did peak-period commuters since most improvements implemented under the corridor traffic management plan were not directed at mid-day travel. Moreover, the uncertainty confronting users as to mid-day (construction) work activities such as the mid-day reversal of the "express" lanes forced these users to reconsider mode choices and make alternative travel plans to complete trips previously made on the Expressway. The public information program reinforced these notions by discouraging Expressway travel.

3.1.4 Alternate Routes, Screenline 1

Massachusetts Turnpike

It was anticipated that some Southeast Expressway travellers might divert as far west as the Massachusetts Turnpike, espe-



SOUTHEAST EXPRESSWAY DIRECTIONAL
VOLUME PEAKING CHARACTERISTICS
BEFORE AND DURING RECONSTRUCTION

CTPS

FIGURE
3-6

cially if traffic conditions on or near the Expressway became severe. A comparison of traffic volumes during April of 1983 and 1984 (averages of Tuesdays, Wednesdays, and Thursdays) shows that the increase in traffic during this period was 1 to 2% (1,300 vehicles) higher than the expected yearly increase of about 4%.[4] Some of these additional vehicles most likely represent diversions from the Expressway, probably drivers from communities located halfway between the Turnpike and the Expressway. Table 3.3 shows this growth in traffic between April 1983 and several months of 1984.

TABLE 3.3

Traffic Counts Before and During Reconstruction
Massachusetts Turnpike at Allston (Exits 19, 20)
(6 AM - 7 PM)

Before ('83)	During ('84)			
(April)	(April)	(May)	(June)	(July)
(EB) 37,500	39,800	40,750	41,650	38,900
(WB) 35,350	37,300	37,950	38,750	36,600

Note: All counts are 13-hour averages of Tuesdays, Wednesdays, and Thursdays of each month.

Data on a hourly basis for the Turnpike volumes were not available. Therefore, peak period traffic levels were not analyzed.

Route 1

With the exception of the Massachusetts Turnpike, Route 1 is located farthest to the west of the Southeast Expressway of all alternate routes analyzed. All other things being equal, the presumption was made that proportionately fewer vehicles would switch to Route 1 than to the alternate routes closer to the Expressway in order to minimize the time and distance added to the trip. As seen in Table 3.4 however, this was not the case. Instead, Route 1 monitored on the Jamaicaway at Perkins Street experienced the largest absolute increase in traffic between April, 1983 and 1984 of all alternate route count locations. Nearly 8,000 vehicles (4,200 northbound, 3,450 southbound), or

[4]Based on the average yearly increase in traffic between 1981-1983, +4.2%.

more than a 26% increase, was recorded, as opposed to an expected increase of about 2%.[5]

TABLE 3.4

Traffic Counts Before and During Reconstruction
Route 1 (Jamaicaway at Perkins Street)
(6 AM - 7 PM)

Before ('83)	During ('84)
(April)	(April 24-26)
(NB) 15,950	20,150
(SB) 12,650	16,100

It should be noted that although the "during" count seems reliable (a 48-hour tube count in late April of this year), the "before" count may be less so. This count, performed by the Boston Redevelopment Authority, was an October, 1980 11-hour count (7:00 AM - 6:00 PM) adjusted[6] to an April 1983 13-hour count for the purpose of this analysis.

Nevertheless, assuming the validity of this large increase, and as seen later in the discussion of Screenline 2 which at the Boston-Dedham line showed a slight decrease in traffic, this additional traffic seems to have diverted to Route 1 via smaller arterials north of and parallel to Route 128. Some of these would include Route 203 (Morton Street) and the West Roxbury Parkway. Unfortunately, no counts are available on these streets to corroborate the above conclusion.

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[5]Based on average yearly increases for three arterials in the Boston region between 1980-1983 (for April-May): Rte. 1A at the Boston-Revere line; Rte. 38 in Somerville, east of the Medford line; and, Rte. 138 in Milton.

[6]Based on April 1983/October 1980 ratios of traffic (1.056) for three arterials in the Boston region: Rte. 1 in Dedham, Rte. 1A at the Boston-Revere line, and Rte. 138 in Milton.

Peak period counts for the peak direction at this location on Screenline 1 are seen in Table 3.5.

TABLE 3.5

Traffic Counts Before and During Reconstruction
Route 1 (Jamaicaway at Perkins Street)
(6 - 9 AM, NB; 3 - 6 PM, SB)

Before ('83)	During ('84)
(April)	(April 24-26)
(NB) 5,350	6,650
(SB) 4,800	6,150

Blue Hill Avenue

This location on Screenline 1, Columbus Avenue south of Washington Street, shows quite a large imbalance between northbound and southbound traffic for the 13-hour period analyzed. Table 3.6 displays these traffic volumes from April 1983 and 1984.

TABLE 3.6

Traffic Counts Before and During Reconstruction
Blue Hill Avenue (Columbus Avenue, South of Washington Street)

Before ('83) During ('84) (6 AM - 7 PM)	
(April-May)	(April 24-26)
(NB) 9,850	10,550
(SB) 5,750	6,150
Peak Periods (6 - 9 AM, NB; 3 - 6 PM, SB)	
(NB) 2,850	3,100
(SB) 2,000	2,150

The increase in traffic between April 1983 and 1984 (7%) is significantly larger than what would have been expected (about

2%)[7]. Peak period volumes in the peak direction were approximately 8% higher in April 1984 than 1983. A major reason for this increase may be that the Blue Hill Avenue and Dorchester Avenue routes were designated by the MDPW as alternate routes for trucks travelling to and from Boston.

Dorchester Avenue

This alternate route is no more than one-half mile away from the Expressway at any point between Rte. 128 and downtown Boston. The count location on Screenline 1, Dorchester Avenue south of Preble Street by Andrew Square, is near two Expressway interchanges: north of Columbia Road, and east of Southampton Street. Table 3.7 displays the "before" and "during" counts.

TABLE 3.7

Traffic Counts Before and During Reconstruction
Dorchester Avenue, South of Preble Street

Before ('83) (6 AM - 7 PM)	During ('84) (6 AM - 7 PM)
(April-May)	(April 24-26)
(NB) 2,950	4,100
(SB) 2,900	3,800
Peak Periods (6 - 9 AM, NB; 3 - 6 PM, SB)	
(NB) 800	1,250
(SB) 1,250	1,350

As shown, about 2,000 more vehicles passed this point in April of 1984 than in 1983, an increase of 35%. The peak period, peak direction volumes also increased during this time, particularly in the northbound direction (56% NB, 8% SB).

Morrissey Boulevard

This route, the only alternate route located primarily to the east of the Southeast Expressway, showed the largest percen-

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[7]See above for Route 1. For the purpose of this analysis, it was assumed that all alternative routes (except the Turnpike) would have been expected an increase in traffic between April 1983 and April 1984 of about 2%.

tage increase in traffic of all routes between April 1983 and 1984. A count on L Street north of Day Boulevard, on Screenline 1, is the basis for the information shown in Table 3.8.

TABLE 3.8

Traffic Counts Before and During Reconstruction
Morrissey Boulevard (L Street, North of Day Boulevard)

Before ('83) During ('84) (6 AM - 7 PM)	
(April-May)	(April 24-26)
(NB) 2,700	4,500
(SB) 2,600	4,250
Peak Periods (6 - 9 AM, NB; 3 - 6 PM, SB)	
(NB) 950	1,700
(SB) 1,000	1,850

This route shows an overall increase of around 65% (3,450 vehicles), distributed rather evenly northbound (1,800 vehicles) and southbound (1,650 vehicles). The peak period, peak direction counts show even greater percentage increases in traffic of almost 80% northbound and 85% southbound.

3.1.5 Alternate Routes - Screenline 2

As mentioned earlier, most of the "before" data for Screenline 2 were obtained from tube counts taken in 1983 or earlier. This was done in order to obtain counts that were true "before" volumes, ("before" counts from March 1984 may have included vehicles that switched in anticipation of reconstruction).

Massachusetts Turnpike

As with the Allston count on Screenline 1, the second count location on the Massachusetts Turnpike also showed a larger than expected increase in traffic between April 1983 and 1984. This was an increase of almost 6,000 vehicles (over 9%), some 3 to 4% (about 2,200 vehicles) greater than expected.[8] Table 3.9 displays the "before" and "during" Turnpike counts at Screenline 2.

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[8]Based on yearly increases between 1981-1983 (+5.9% per year).

TABLE 3.9

Traffic Counts Before and During Reconstruction
Massachusetts Turnpike at Rte. 128 (Interchange 15)
(6 AM - 7 PM)

Before ('83)	During ('84)			
(April)	(April)	(May)	(June)	(July)
(NB) 33,150	36,350	36,800	37,950	35,500
(SB) 29,850	32,600	33,050	33,950	32,150

Peak period counts are not analyzed because no hourly volumes were available.

Route 1

Table 3.10 shows the "before" and "during" counts for this location on Route 1. These counts show that northbound traffic increased slightly between April 1983 and 1984, and then decreased somewhat during May of 1984. A relatively small decrease in southbound traffic occurred, yielding a combined decrease of about 500 vehicles (-1.9%), compared with an expected 2% increase.

TABLE 3.10

Traffic Counts Before and During Reconstruction
Route 1 (at the Boston-Dedham Line)

(6 AM - 7 PM)				
Before ('83)	During ('84)			
			May	
(April)	(April-May)		(22-24)	(29-31)
(NB) 9,750	9,950		9,900	9,850
(SB) 16,550	15,850		15,850	15,450
Peak Periods (6 - 9 AM, NB; 3 - 6 PM, SB)				
(NB) 2,950	2,750		2,650	2,650
(SB) 5,300	5,050		5,050	4,800

The peak period counts show that traffic decreased in both the northbound and the southbound directions, almost 5% and 7%, respectively. These decreases continued somewhat through May, possibly indicating that, at least during the northbound peak period, diverted traffic was returning to the Expressway.

Blue Hill Avenue

Traffic on Blue Hill Avenue at the junction of three arterials from Route 128 to Mattapan (Rte. 138, Rte. 28, Unquity Road-Blue Hills Parkway) showed very little overall change from "before" to "during" reconstruction (-0.2%, or 50 vehicles). This seems somewhat puzzling since, as mentioned earlier, the Blue Hill Avenue route had been designated as a truck route alternative, and the count location for this route at Screenline 1 (Columbus Avenue south of Washington Street) showed a 7% total increase in traffic. The increase in traffic most likely occurred between the two screenline count locations, via Route 203 and other streets intersecting with Blue Hill Avenue.

There was a 5% decrease in northbound traffic, and a 5% increase southbound at Screenline 2. As seen in Table 3.11, traffic then increased in early June before a subsequent decrease.

TABLE 3.11

Traffic Counts Before and During Reconstruction
Blue Hill Avenue, South of River Street

(6 AM - 7 PM)				
Before ('83)	During ('84)			
		June		July
(April-May)	(May)	(5-6)	(26-28)	(17-19)
(NB) 15,300	14,550	14,850	14,550	14,150
(SB) 13,650	14,350	14,850	14,200	13,750
Peak Periods (6 - 9 AM, NB; 3 - 6 PM, SB)				
(NB) 5,500	4,750	4,650	4,600	4,450
(SB) 4,800	4,650	5,100	4,950	4,700

With the exception of a southbound traffic increase between May and early June in 1984, the trends of peak period, peak direction counts showed steady decreases from April 1983.

Dorchester Avenue

Although not as large an increase as at Screenline 1, traffic increased at this location by about 7% between April 1983 and 1984, greater than the expected increase of 2%. Northbound, the increase was only 2%, while southbound traffic increased by 13%. It is logical that traffic would increase at this location, particularly due to its designation as a truck route. Counts at this location are shown in Table 3.12.

TABLE 3.12

Traffic Counts Before and During Reconstruction
Dorchester Avenue (Granite Avenue at the Neponset River)

(6 AM - 7 PM)				
Before ('83)	During ('84)			
(April-May)	(April-May)	June (5-7)	July (17-19)	
(NB) 11,000	11,250	12,300	11,100	
(SB) 7,400	8,400	9,700	8,600	
Peak Periods (6 - 9 AM, NB; 3 - 6 PM, SB)				
(NB) 3,650	3,200	3,550	2,850	
(SB) 2,600	2,900	3,300	2,900	

Peak period, peak direction counts fluctuated in both directions by about 700-800 vehicles from the April 1983 "before" counts.

Morrissey Boulevard

The count location on Morrissey Boulevard, Rte. 3A over the Neponset River between Boston and Quincy, experienced the greatest absolute traffic decrease (-5,750 vehicles, or -11 percent) measured on Screenline 2 including the Southeast Expressway. Very likely due to its nearness to the Expressway on-ramp at Neponset Circle, many travellers apparently realized that this location would become extremely congested once reconstruction began. Table 3.13 displays the counts for this location.

TABLE 3.13

Traffic Counts Before and During Reconstruction
Morrissey Boulevard (Rte. 3A Over the Neponset River)

(6 AM - 7 PM)				
Before ('83)	During ('84)			
(April-May)	(April-May)	June (5-7)	July (17-19)	
(NB) 25,750	23,350	25,200	24,800	
(SB) 26,050	22,650	23,300	22,600	
Peak Periods (6 - 9 AM, NB; 3 - 6 PM, SB)				
(NB) 9,350	7,500	8,000	7,850	
(SB) 9,750	7,850	7,850	7,700	

Northbound traffic decreased by over 9%, while the decrease southbound was more than 13%. In early June, traffic increased somewhat, and decreased again by mid-July, in both directions.

Route 3A at this location serves as a major access point onto the Expressway. It is not surprising then that the decrease in 13-hour traffic on the Expressway at Southampton Street (-9,350) is roughly equal to the decreases on the Expressway at the Neponset River (-4,750), and on Rte. 3A (-5,750).

This relationship, however, is not as clearly defined for the peak period, peak direction counts. Northbound traffic increased at Southampton Street, while traffic remained the same on the Expressway over the Neponset River, and decreased on Rte. 3A. Southbound traffic decreased at all three locations, but more so at the two "combined" southern locations than at Southampton Street.

Additional Alternative Routes

Traffic counts were also taken on four additional alternate routes crossing Screenline 2.[9] These were seen to be less important as viable alternate routes to the Expressway, but were still monitored by the MDPW for changes in traffic levels.

The combined 13-hour levels of traffic for these routes are shown below in Table 3.14.

TABLE 3.14

Traffic Counts Before and During Reconstruction
Four Alternative Routes Crossing Screenline 2

(6 AM - 7 PM)			
	Before ('83) (April-May)	(%)	During ('84) (April-May)
(NB)	31,400	-950 (-3.0)	30,450
(SB)	29,750	+300 (+1.0)	30,050
Total	61,150	-650 (-1.1)	60,500

[9]Washington Street at the Boston-Dedham line; Hyde Park Avenue, north of Metropolitan Avenue; Central Avenue at the Boston-Milton line; and, (lower) Dorchester Avenue at the Boston-Milton line.

TABLE 3.14 (continued)

Traffic Counts Before and During Reconstruction
Four Alternative Routes Crossing Screenline 2

	Peak Periods (6 - 9 AM, NB; 3 - 6 PM, SB)		
(NB)	8,800		9,550
		+750 (+8.5)	
(SB)	10,300		10,350
		+50 (+0.5)	
Total	19,100		19,900
		+800 (+4.2)	

This table shows that a small combined decrease in traffic took place between April-May of 1983 and 1984, thus suggesting that these routes were in fact less important alternates to the Expressway than some of the other routes analyzed above.

3.1.6 Findings

The principal findings of the "before" to "during" comparison are that (1) Expressway traffic volume declined during the first year of reconstruction, but returned to and slightly exceeded pre-reconstruction levels during the second year (1985), and (2) first year volumes on the MDPW designated alternate routes increased in aggregate. During the first year between 6:00 AM and 7:00 PM:

- o Expressway traffic declined by more than 9,000 vehicles at Southampton Street, and nearly 5,000 at the Neponset River.
- o All five alternate routes experienced volume increases which when combined exceeded the 9,000 vehicle reductions on the Expressway at Screenline 1.
- o Traffic volume changes at the more remote Screenline 2 locations were mixed, but declined overall.

Peak period traffic between 6 AM and 9 AM, northbound:

- o On the Expressway, increased by approximately 1,750 vehicles in the first year of reconstruction at Southampton Street, (Screenline 1).
- o During the second phase of reconstruction again increased by a total of 2,050 vehicles.
- o At Screenline 2, (Neponset River) also tended to increase, but at lower levels; plus 150 (first year) and by an additional 950 the second year.

Peak period Expressway traffic between 3 PM and 6 PM, southbound:

- Declined by approximately 1,150 vehicles the first year at Southampton Street, (Screenline 1).
- Increased by approximately 700 vehicles the second year at the same location.
- Also experienced lower volumes at Screenline 2, (-1,050) in the first year and increases during the second phase (+450).

Among the alternate routes, consistent volume increases by direction where found to have occurred in before/during comparisons at the Boston-end, Screenline 1. Screenline 2 counts, however, were less reliable due to the difficulties of collecting comprehensive screenline counts 4 to 5 miles from the core area.

3.1.7 Conclusions

The corridor traffic management plan provided the Southeast Expressway with additional capacity in the peak direction during peak hours. Capacity and safety improvements were also effective on the MDPW designated alternate routes. Public information efforts encouraged Expressway auto-users to seek alternate routes during the reconstruction and to avoid Expressway use whenever possible. The traffic counting effort provided relatively reliable traffic count data at the Boston-end screenline which showed how users responded to the reconstruction and the traffic management efforts.

Prior to the reconstruction, peak-period traffic in the peak direction consistently reached the physical carrying capacity of the road. The additional capacity made available by the reconstruction configuration increased the vehicle service rate, better meeting existing demands and permitting peak hour volumes to rise in the AM peak. During the second year, the dissemination of public information was reduced since the public had already become generally well-informed and because traffic had continued to move well through the project. As discussed in the following chapter, second year peak volumes again began to approach service volume capacity and travel times lengthened in response.

Despite the increased volume of morning peak traffic, the 13-hour (6:00 AM - 7:00 PM) Expressway volume had declined following the start of reconstruction. During the second year, morning and evening peak volumes grew, but the morning peak continued to exceed evening volumes. Notably, the traffic shifts which caused the 13-hour volume reductions were confined to mid-day and evening peak periods.

The reasons for the diversion of mid-day trips are not readily apparent in the information collected as part of the

traffic monitoring effort. However, a number of observations can be made which support the likelihood that discretionary Expressway travel was detered by the traffic management program:

- -Work trip travel on the Expressway continued at or above pre-reconstruction levels throughout reconstruction as seen in the comparisons of northbound before and during peak volumes.

- -Peak period traffic volume changes on alternate routes were consistent between morning and evening periods indicating changes in work trip patterns only.

- -Public transit improvements were generally geared to better peak period service and therefore had little effect on mid-day general purpose users.

- -The public information program discouraged discretionary use of the facility.

- -Mid-day users were confronted with the additional uncertainty of the effects which express lane reversal might have on Expressway trips.

- -Discretionary trips such as shopping, social and to a lesser extent medical and personal business, can be satisfied by alternative destinations.

It is therefore plausible that the reductions in mid-day and evening peak travel apparent on the facility stemmed from an absence of discretionary mid-day trips. This discretionary travel, moreover, appears to have been eliminated from the corridor and diverted from downtown Boston to suburban destinations.

During the second year of reconstruction, volumes increased overall on the Expressway and in a consistent manner during morning and evening peak periods. As a result, the relationship between morning and evening peak volume held as morning volumes continued to be more concentrated than the evening totals.

3.2 TRAVEL TIME

3.2.1 Introduction

Prior to the start of reconstruction activities, concerns were expressed about the potential for excessive vehicle delay on and off the project site. To assess the ongoing impact of the reconstruction as well as the overall effectiveness of the express lane/local lane and alternate route improvements, the MDPW conducted travel time surveys "before" and "during" reconstruction.

Of immediate concern were conditions during morning and evening peak commuting hours in the peak direction. However, preliminary assessments had also shown that the loss of capacity in the off-peak direction might result in significant delays. Therefore, AM and PM peak-directed travel on the Expressway and alternate routes, and evening off-peak (northbound) traffic, were sampled.

3.2.2 Data Collection

Travel time data were collected with speed runs made on the Expressway and on alternate routes. Peak period/peak direction runs were made voluntarily by MDPW and CARAVAN (vanpool) drivers during their usual commute. Supplemental and off-peak (northbound) time runs were also done. Surveyors were supplied with maps and field sheets indicating where times were to be recorded. Time, direction, and type of lane (express or local) were recorded.

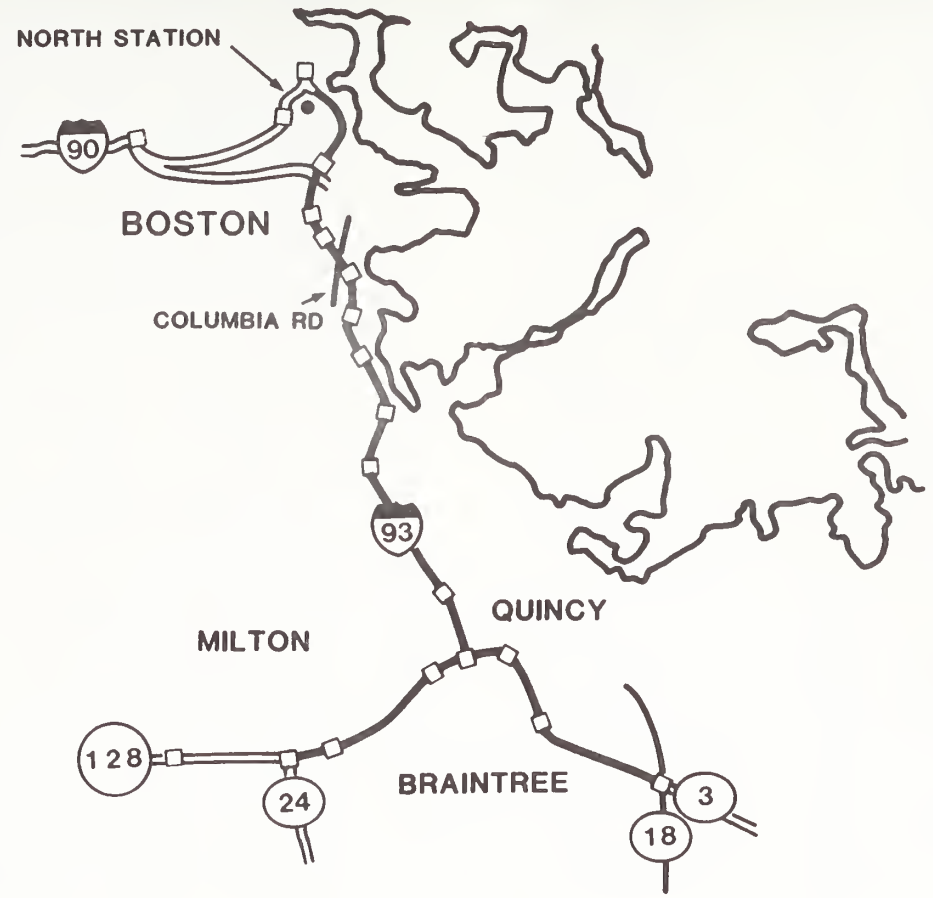
Data were collected in two phases. The "before" phase started on October 21, 1983 and ended March 19, 1984 when operation of the reversible express lanes began. For the first year, data were collected intensively from March 19th through the end of May. Some data were collected through the remainder of the reconstruction project.

For Expressway runs, two routes were defined, one with a starting point at the interchange of Route 128 and Route 24 (a southwestern terminus) and another starting at the interchange of Route 3 and Route 18 (southeast of the project). The construction section of the Expressway, between Route 128 and Columbia Road was common to both routes. The location of the Expressway sections are shown in Figure 3-7.

3.2.3 Data Processing

Prior to statistical analysis, the travel time distributions were evaluated for extreme values. Extreme values were attributed to either recording errors or unusual traffic conditions such as accidents. Since the intention of the analysis was to compare the "most likely" travel times "before" and "during" reconstruction, extreme cases were not included in the statistical or graphic displays.

The data was grouped into half-hour time intervals from 6:00-10:00 AM and 3:00-7:00 PM. On the Expressway, the interchange of the Southeast Expressway and Columbia Road was used as a beginning/ending reference point. For the alternate routes, the time reference points were chosen so that they were located on an east-to-west screenline passing through Columbia Road and the Southeast Expressway. The data for the Expressway was summarized by Expressway section. These sections are: Route 128 between Routes 24 and 3; Route 3 between Route 18 and the



SOUTHEAST EXPRESSWAY AND OTHER SECTIONS CHOSEN FOR TRAVEL TIME ANALYSIS

CTPS

FIGURE 3-7

Southeast Expressway; and the Southeast Expressway between Route 128 and Columbia Road. Summaries of total travel time for the alternate routes and the Expressway (from either starting point) were also prepared.

The "during" travel times for the construction section (Route 128 to Columbia Road) were tabulated by lane type (local or express). The "during" total Expressway times were also summarized "with local lanes" and "with express lanes".

Statistical summaries and plots of the first year travel times can be found in appendix C.

3.2.4 Analysis - First Reconstruction Season

Table 3.15 contains a summary of travel times for the Expressway and the alternate routes by section/route, project phase (before/during) and direction for the time periods 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. The numbers under the "before" and "during" columns are weighted averages. "Change" is the difference between "before" and "during" travel times.

o Southeast Expressway

Northbound AM and Southbound PM Peak

Overall, travel times declined in the northbound AM peak and southbound PM peak periods. In the northbound AM direction, the maximum time difference was 4.1 minutes for the three sections, with the highest decrease occurring on express lane sections. The northbound travel times between 6:00 AM and 10:00 AM within the construction site are exhibited in Table 3.16 and plotted in Figure 3-8. It is interesting to note that the express lane curve lies consistently below the "before" and the local lane curve. Also, two peaks at 8:00 AM and 9:00 AM are distinct in the "before" and local lane curves. However, because of a lack of observations on the express lanes during the half-hour ending at 9:00 AM, it was not obvious whether the same pattern existed for the express lanes or if there had been a shift in the northbound peak.

In the southbound direction, the reductions were generally smaller than in the northbound. From Table 3.15, the "before" travel time for the construction site was 13.2 minutes which dropped to 12.1 minutes and 11.7 minutes on the express and local lanes respectively. Figure 3-8 also contains the plots of the "before" and "during" times for the construction section between 3:00 PM and 7:00 PM. Again, as in the morning peak the express lane curve always lies below the "before" curve. The local lanes appear to have performed better than the express lanes between 5:00 PM and 6:00 PM. However, as Table 3.17 shows, the time averages for the local lanes were based on a very small number of observations as compared to the express lanes.

	Northbound, AM[1]				Northbound, PM[2]				Southbound, PM[2]			
	Before	During	Change	%	Before	During	Change	%	Before	During	Change	%
Expressway Section												
Rt. 128, between Rt. 24 & Rt. 3	4.0	4.0	0.0	0	3.3	4.2	+0.9	+26	3.9	3.6	-0.3	-8
Rt. 3 between Rt. 18 & S.E. Xway	7.8	5.8	-2.0	-26	4.0	4.7	+0.7	+18	5.0	5.4	+0.4	+8
S.E. Xway between Rt. 128 & Columbia Road: Express Lanes	17.6	13.5	-4.1	-23						12.1	-1.1	-8
Local Lanes	17.6	14.6	-3.0	-17	9.0	11.0	+2.0	+22	13.2	11.7	-1.5	-11
Alternative Routes												
Blue Hill Avenue	44.4	45.6	+1.2	+3					47.0	43.0	-4.0	-9
Blue Hill Avenue (Modified)	35.3	34.9	-0.4	-1					42.3	36.3	-3.0	-14
Dorchester Avenue	44.6	49.0	+4.4	+10					47.7	42.0	-5.7	-12
Morrissey Blvd.	44.0	43.0	-1.0	-2					51.3	49.0	-2.3	-5
Route 1	46.8	37.7	-9.1	-20					53.0	57.0	+4.0	+8

Note: All travel times are in minutes.
[1]All travel times are in minutes.
[2]7 AM to 9 AM and 4 PM to 6 PM.

TRAVEL TIMES BEFORE AND DURING CONSTRUCTION
FOR THE TWO AM AND PM PEAK HOURS
FOR SOUTHEAST EXPRESSWAY SECTIONS
AND THE ALTERNATE ROUTES

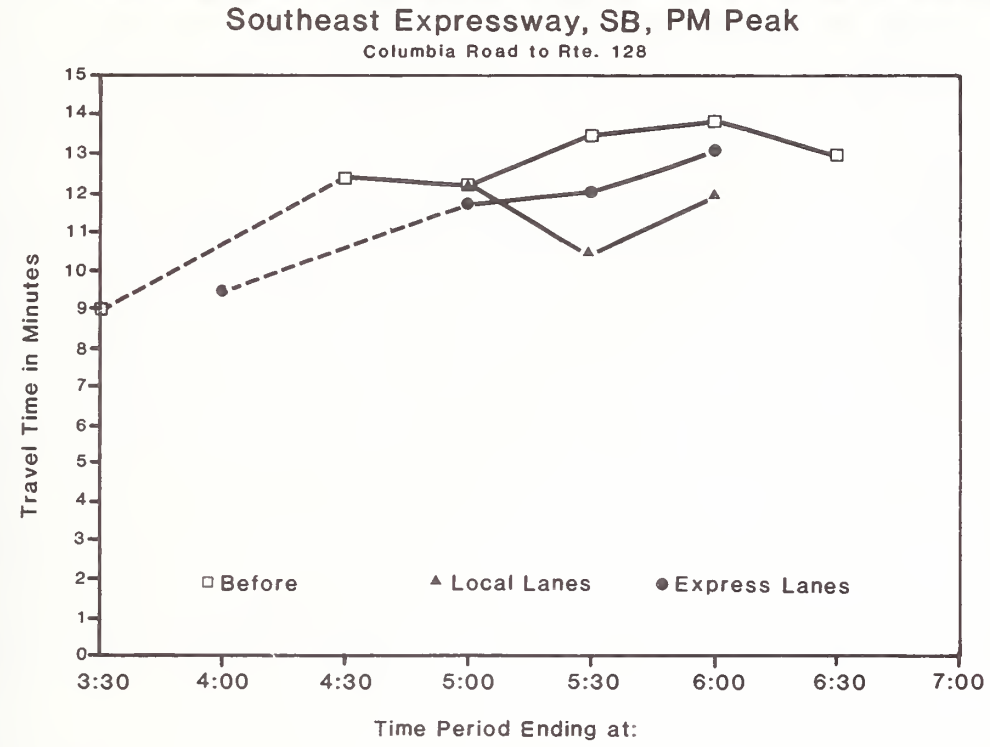
CTPS
TABLE
3.15

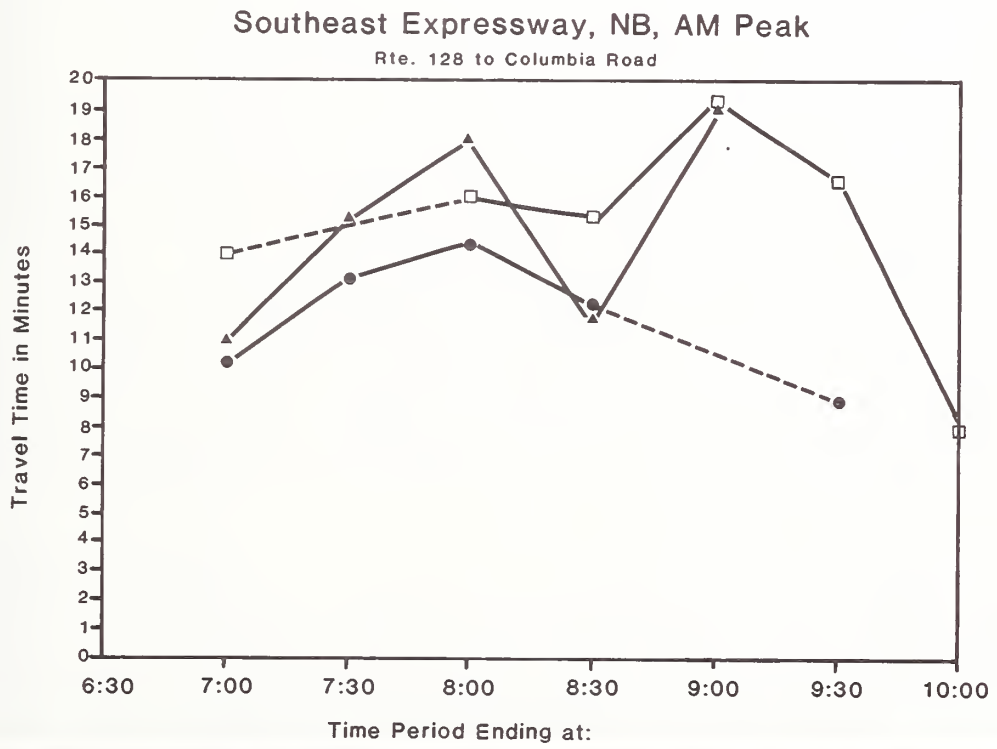
Time Period	Travel Times Before Construction[1]				Travel Times During Construction[1]							
					Local Lanes				Express Lanes			
	# of Observations	Avg.	Min.	Max.	# of Observations	Avg.	Min.	Max.	# of Observations	Avg.	Min.	Max.
6:00-6:30	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0
6:30-7:00	2	14.0	14.0	14.0	1	11.0	11.0	11.0	9	10.2	9.0	14.0
7:00-7:30	1	28.0	28.0	28.0	4	15.3	11.0	19.0	14	13.2	9.0	18.0
7:30-8:00	3	16.0	13.0	20.0	3	18.0	14.0	20.0	38	14.4	8.0	21.0
8:00-8:30	32	15.3	8.0	25.0	6	11.8	9.0	15.0	22	12.1	8.0	19.0
8:30-9:00	39	19.3	8.0	30.0	1	19.0	19.0	19.0	0	0.0	0.0	0.0
9:00-9:30	2	16.5	14.0	19.0	0	0.0	0.0	0.0	1	9.0	9.0	9.0
9:30-10:00	2	8.0	7.0	9.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0

[1]Time reference point at Columbia Road and Southeast Expressway

SOUTHEAST EXPRESSWAY
FROM ROUTE 128 TO COLUMBIA ROAD
NORTHBOUND, AM

CTPS
TABLE
3.16





	SOUTHEAST EXPRESSWAY PEAK PERIOD, PEAK DIRECTION PLOTS	CTPS FIGURE 3-8

Time Period	Travel Times Before Construction[1] # of Observations	Avg.	Min.	Max.	Travel Times During Construction[1] Local Lanes # of Observations	Avg.	Min.	Max.	Express Lanes # of Observations	Avg.	Min.	Max.
3:00-3:29	2	9.0	8.0	10.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0
3:30-3:59	0	0.0	0.0	0.0	0	0.0	0.0	0.0	2	9.5	9.0	10.0
4:00-4:29	5	12.4	11.0	14.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0
4:30-4:59	18	12.2	9.0	15.0	4	12.3	10.0	15.0	33	11.8	8.0	18.0
5:00-5:29	50	13.5	8.0	20.0	2	10.5	10.0	11.0	23	12.1	8.0	20.0
5:30-5:59	9	13.9	11.0	17.0	1	12.0	12.0	12.0	11	13.2	9.0	17.0
6:00-6:29	2	13.0	13.0	13.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0
6:30-6:59	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0

[1]Time reference point at Columbia Road and Southeast Expressway

SOUTHEAST EXPRESSWAY
FROM COLUMBIA ROAD TO ROUTE 128
SOUTHBOUND, PM

CTPS
TABLE
3.17

The travel time improvements were associated with two factors (1) the added capacity of the express lanes and closure of certain on and off ramps and (2) the reduction in traffic volumes from diversions to other modes of travel and routes.

During reconstruction, the number of lanes in the peak period remained the same. However, capacity was effectively increased since two lanes were used for express travel only. For seven miles, between Columbia Road and Route 128, the express lanes offered undisturbed driving since trucks were prohibited and lane changing was kept to a minimum. In addition, the closure of certain on and off ramps to accommodate the reconstruction of bridges benefited local lane travel times by minimizing the occurrence of weavings and slow-downs.

The percent reductions in Expressway traffic volumes following the start of reconstruction are shown in Table 3.19. At the Southeast Expressway and Southampton Street location, traffic counts taken between 6:00 AM and 7:00 PM show declines of eight percent. However, most of the reduction (15%) occurred in the off-peak rather than in the peak period.

From the above discussion, two points can be made:

1. The improved level of service, as measured by travel times, achieved on the Expressway during the northbound AM and southbound PM peaks was due to traffic management methods (i.e., express lanes) not reduced traffic volumes.

2. From Table 3.18, work trip patterns were not affected by first-year reconstruction. Work-trip volumes remained the same or slightly higher. Non-work trips made in off-peak periods dropped by 15%.

Finally, travel times are subject to seasonal variation. Travel times on the Southeast Expressway were expected to be lower in the fall and winter than in the spring construction season because traffic volumes are historically lower. Because this analysis compares fall and winter "before" times with spring "during" times, the real reduction in travel times during the construction project was even higher than might have been anticipated.

Northbound, PM Peak

In the afternoon, northbound (off-peak direction) times increased on all Expressway sections (Table 3.16). The average increase was 0.9 minutes for the Route 128 section; 0.7 minutes for the Route 3 section; and 2 minutes for the construction site. Volumes decreased by 10% from 15,449 to 13,876 vehicles (Table 3.19). The reason for the deterioration in the level of service is clearly the reduction of the northbound roadway capacity (from four to two lanes) in favor of the peak period travel in the southbound direction.

	Northbound				Southbound				Both Directions			
	Before[1]	During[2]	Change	%	Before[1]	During[2]	Change	%	Before[1]	During[2]	Change	%
Time Period												
6 AM - 7 PM	63,205	57,000	-6,205	-10	59,952	56,824	-3,128	-5	123,157	113,824	-9,333	-8
6 AM -10 AM	25,263	25,929	+666	+3								
4 PM - 7 PM	15,449	13,876	-1,573	-10	25,518	26,061	+543	+2				
Off-peak									72,376	61,834	-10,542	-15

[1]"Before" counts were taken in May 1983.

[2]"During" counts were taken in May 1984.

SOUTHEAST EXPRESSWAY AT SOUTHAMPTON STREET
CHANGE IN TRAFFIC VOLUMES FOR VARIOUS TIME PERIODS

CTPS

TABLE

3.18

o Alternate Routes

Travel times on the alternate routes, were recorded for the northbound AM and southbound PM peaks. The analysis is based on fewer observations and the results contained in Table 3.15 should be used with some caution. However, as a general trend, travel times on the alternate routes appear to have improved. At the same time, Table 3.19 shows that traffic volumes on alternate routes increased following the start of construction. Morrissey Boulevard and Dorchester Avenue are located closer to the Expressway than the other alternate routes and experienced the highest traffic growth.

The improvement in travel times on the alternate routes in spite of the volume increases can be mainly attributed to traffic management measures which were implemented by the MDPW after reconstruction started. Thirty-four locations in the cities of Boston, Milton and Quincy were examined for capacity deficiencies and 29 were treated with equipment and traffic detector repairs, signal coordination and retiming. For increased efficiency in roadway capacity utilization, pavement markings were restriped in 24 locations and additional enforcement personnel for directing traffic became available at key intersections.

3.2.5 Analysis - Second Reconstruction Season

Throughout the second phase of reconstruction, peak period travel times in either direction on the Expressway returned to pre-reconstruction levels. In fact, southbound evening peak travel times were higher during the second year than either first year or "before" reconstruction travel times. As shown in Table 3.20, second year travel times northbound (AM) approached pre-reconstruction times of 17.6 minutes on both the express lanes (17.4 minutes) and local lanes (17.6 minutes). Southbound (PM) times, however, increased beyond the pre-reconstruction average of 13.2 minutes to 14.3 minutes in the express lanes and 17.7 minutes in the local lanes. Changes in local lane travel were the most significant. During the first year, southbound local lane times were shorter on average than all other peak period/peak direction trips. During the second year, however, the average southbound local lane trip was of the longest duration among peak period/peak direction trips.

It is likely that increased traffic volume and/or the presence of construction activity on the southbound lanes had a dampening effect on local lane flows. Generally, the presence of construction activity would not be expected to adversely affect traffic flow since barriers and screens were maintained into the second year to limit contact between the traffic and construction crews. In fact, construction work practices were unchanged between construction seasons. Consequently, the increase in traffic volume was most likely the principal cause of the deterioration of travel times experienced during the second year.

Route	Location	Before		During		Percent Change	
		AM[1]	PM[2]	AM[1]	PM[2]	AM[1]	PM[2]
Blue Hill Avenue	Columbus Street, South of Washington Street	2,650	2,731	2,650	3,255	0	19
Dorchester Avenue	South of Preble Street	923	1,240	1,305	1,440	41	16
Morrissey Boulevard	"L" Street, North of Day Boulevard	920	1,170	1,580	1,990	72	62
Route 1	Jamaica Way, North of Perkins	5,125	5,290	6,550	6,755	28	28

[1] 7 AM to 9 AM.

[2] 4 PM to 6 PM.

PERCENT CHANGE IN VOLUMES AT LOCATIONS ALONG THE ALTERNATE ROUTES FOR THE TWO AM AND PM PEAK HOURS

CTPS

TABLE 3.19

	Reconstruction Season			Change in Travel Times			
		First	Second	First to Second		Before to Second	
	Before	('84)	('85)	Absolute	%	Absolute	%
Northbound AM[1]							
Express Lanes	17.6	13.5	17.4	3.9	28.9	-0.2	-1.1
Local Lanes	17.6	14.6	17.6	3.0	20.6	0.0	0.0
Southbound PM[2]							
Express Lanes	13.2	12.1	14.3	2.2	18.2	1.1	8.3
Local Lanes	13.2	11.7	17.7	6.0	51.3	4.5	34.1
Northbound AM[1]							
Blue Hill Avenue	44.4	45.6	47.7	2.1	4.6	3.3	7.4
Blue Hill Avenue (modified)	35.3	34.9	38.6	3.7	10.6	3.3	9.4
Dorchester Avenue	44.6	49.0	41.6	-7.4	-15.1	-3.0	-6.7
Morrissey Boulevard	44.0	43.0	48.5	5.5	12.8	4.5	10.2
Route 1	46.8	37.7	N/A	0.0	0.0	0.0	0.0
Southbound PM[2]							
Blue Hill Avenue	47.0	43.0	44.0	1.0	2.3	-3.0	-6.4
Blue Hill Avenue (modified)	42.3	36.3	36.0	-0.3	-0.8	-6.3	-14.9
Dorchester Avenue	47.7	42.0	N/A	0.0	0.0	0.0	0.0
Morrissey Boulevard	51.3	49.0	47.5	-1.5	-3.1	-3.8	-7.4
Route 1	53.0	57.0	N/A	0.0	0.0	0.0	0.0

Note: All travel times are in minutes.
[1]7 AM to 9 AM.
[2]4 PM to 6 PM.

PEAK PERIOD TRAVEL TIMES BEFORE AND DURING THE FIRST AND SECOND CONSTRUCTION SEASONS FOR EXPRESSWAY SECTIONS AND ALTERNATE ROUTES

CTPS

TABLE 3.20

3.2.6 Findings - Travel Time

- During the first year of reconstruction, peak period travel times on the Expressway and alternate routes declined. While all sections of the Expressway showed a decrease in travel time, the reconstruction site, between Route 128 and Columbia Road was of particular importance. In the morning two-hour peak (7:00 AM to 9:00 AM), the northbound travel time before reconstruction was 17.6 minutes. During reconstruction, the travel time dropped to 13.5 minutes on the express lanes and 14.6 minutes on the local lanes, a reduction of 4.1 and 3.0 minutes respectively.

- In the afternoon two-hour peak (4:00 PM to 6:00 PM), the "before" southbound travel time for the length of the construction was 13.2 minutes. After reconstruction started, the travel time for the same time interval was reduced to 12.1 minutes for the express lanes and 11.7 minutes for the local lanes.

- During the second phase of reconstruction, Expressway travel times returned to and in some instances exceeded "before" reconstruction levels.

- The northbound (peak period, off-peak direction) travel times increased for all sections of the Expressway after the beginning of construction. In particular, the construction site (Route 128 to Columbia Road) increase was two minutes; from nine minutes "before" to eleven minutes "during."

3.2.7 Conclusions - Travel Time

- The improved level of service (as measured by travel time) achieved in the first year of reconstruction was due to traffic management methods and not traffic volume reductions. Peak period travel demands increased somewhat while traffic operations improved in response to the express lane configuration.

- Second year travel time increases occurred in conjunction with increases in peak period volumes that again approached service volume capacity.

- First year travel time improvements were realized on the five major alternate routes in response to traffic management measures implemented by the MDPW in anticipation of the traffic volume diversions.

- Second year alternate route and Expressway peak period travel time changes were consistent. Morning travel times generally increased regardless of the route examined. However, evening times were stable on the alternate routes, but were significantly higher on the Expressway. While second year alternate route times are less reliable because of the small number of samples, the findings suggest a greater presence of auto-

oriented work trips in the morning that in turn selected the Expressway for the return evening commute.

- The peak period, off peak direction travel time increases were as expected since effective capacity was reduced from three lanes to two during the reconstruction.

4. *Fringe Parking*

CHAPTER 4: FRINGE PARKING

4.1 INTRODUCTION

This chapter presents information on the use of 16 MDPW park and ride lots during the Southeast Expressway reconstruction. A second purpose is to assess the overall success of the park and ride program in the South Shore area and to indicate changes that users themselves have suggested.

4.2 MDPW PARK AND RIDE LOT LOCATION

The MDPW currently owns 34 park and ride lots. In this study, 16 lots were identified as serving portions of the region most affected by the Southeast Expressway reconstruction. Figure 4-1 shows these sites.

Vehicle counts were conducted at each of these sites on Tuesday, Wednesday and Thursday during the weeks of February 12th, 1984 (before construction), April 22nd, 1984 and May 20th, 1985 (during construction). A summary of the sample counts is presented in Tables 4.1 through 4.3.[1] A review of the information contained in the tables indicates that use of these lots generally increased during the period of reconstruction. During the first year there was a seven percent (126 vehicle) average daily increase in parked vehicles, followed by a nine percent (175 vehicle) increase during the second year.

As part of the Expressway mitigation plan, the MDPW increased the capacity of these facilities by 550 spaces or 25.5 percent. Other facilities were also constructed or leased in southeastern Massachusetts but in areas further from the primary access routes. In total, some 1600 commuter park and ride spaces were added. During the two years of reconstruction, an additional 301 vehicles per day were using these facilities.

Although several lots experienced a decline in use following the start of reconstruction, in absolute terms the change in vehicle use was minimal. For instance, a comparison of counts taken in February, 1984 to those of May, 1985 at the Route

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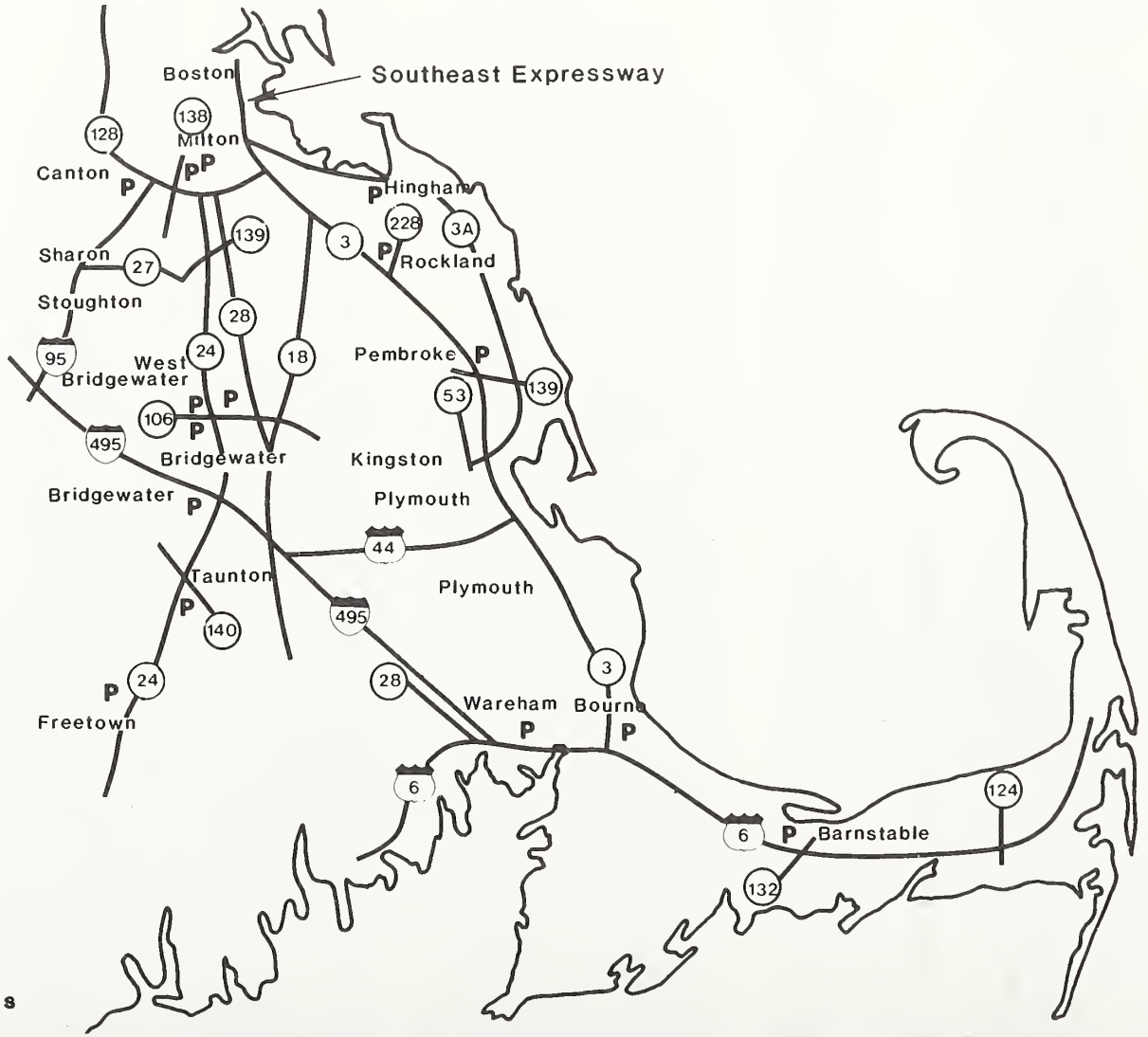
[1]Vehicle counts at the Route 3/Cherry Street site in Plymouth were increased by an average of 38 vehicles per day in both 1984 counts to account for those vehicles parking on the town-provided spaces adjacent to the state facility.



SURVEYED MDPW PARK AND RIDE LOTS

CTPS

FIGURE 4-1

No.	Town	Location	Capacity	Count 2/14/84	Count 2/15/84	Count 2/16/84	Average "Before"	Count 4/24/84	Count 4/25/84	Count 4/26/84	Average "During"	Percent Change
1	Barnstable	Routes 6/132	225	192	189 *	160	180	192	170	171	178	-1.5%
2	Bourne	Route 3 @ Sagamore Circle	400	286	253 *	258	266	259	237	262	253	-4.9%
3	Bridgewater	Route 24/ 104	60	25	20	33	26	34	44	37	38	47.4%
4	Canton	Route 128 @ RR Station	725	553	572	621	582	545	561	597	568	-2.5%
5	Canton	Routes 138/128 @ MDC Lot	100	35	35	33	34	34	37	48	40	15.5%
6	Freetown	Route 24 @ Granp Dean Rd.	30	12	15	22	16	15	17	14	15	-6.1%
7	Hingham	Route 3A @ Hingham Shipyard	200 **	167	182	178	176	237	258	265	253	44.2%
8	Kingston	Routes 3A/53	100	94	97	92	94	82	81	84	82	-12.7%
9	Milton	Hougton Pond Rd.	85	37	33	34	35	33	38	37	36	3.8%
10	Pembroke	Routes 3/139	85	44	44	34	41	16	14	14	15	-63.9%
11	Plymouth	Route 3 @ Cherry St.	130	60	64	58	61	88	90	89	89	46.7%
12	Plymouth	Route 3 @ Longpond Rd.	65	8	9	7	8	8	9	9	9	8.3%
13	Rockland	Routes 3/228	150 **	232	226	230	229	258	270	260	263	14.5%
14	Taunton	Routes 24/140	60	22	23	28	24	35	44	41	40	64.4%
15	W. Bridgewater	Route 106 @ Elm Sq.	40	57	64	65	62	62	61	54	59	-4.8%
16	W. Bridgewater	Route 106/24	122	NA	NA	NA	NA	18	24	27	23	NA
		Total	2577	1824	1826	1853	1834	1916	1955	2009	1960	6.9%

PARK AND RIDE FACILITIES
"BEFORE" AND "DURING"
S.E. EXPRESSWAY CONSTRUCTION
(FIRST YEAR)

CTPS

TABLE

4.1

No.	Town	Location	Capacity	Count 2/14/84	Count 2/15/84	Count 2/16/84	Average "Before"	Count 5/21/85	Count 5/22/85	Count 5/23/85	Average 1985	Percent Change
1	Barnstable	Routes 6/132	225	192	189 ‡	160	180	202	209	195	202	12.0%
2	Bourne	Route 3 @ Sagamore Circle	400	286	253 ‡	258	266	231	254	246	244	-8.3%
3	Bridgewater	Route 24/ 104	60	25	20	33	26	33	31	40	35	33.3%
4	Canton	Route 128 @ RR Station	725	553	572	621	582	588	573	618	593	1.9%
5	Canton	Routes 138/128 @ MDC Lot	100	35	35	33	34	23	24	33	27	-22.3%
6	Freetown	Route 24 @ Gramp Dean Rd.	30	12	15	22	16	18	16	17	17	4.1%
7	Hingham	Route 3A @ Hingham Shipyard	200 ‡‡	167	182	178	176	293	273	280	282	60.5%
8	Kingston	Routes 3A/53	100	94	97	92	94	97	97	92	95	1.1%
9	Milton	Hougton Pond Rd.	85	37	33	34	35	45	46	48	46	33.7%
10	Pembroke	Routes 3/139	85	44	44	34	41	26	25	25	25	-37.7%
11	Plymouth	Route 3 @ Cherry St.	130	60	64	58	61	106	88	82	92	51.6%
12	Plymouth	Route 3 @ Longpond Rd.	65	8	9	7	8	5	3	4	4	-50.0%
13	Rockland	Routes 3/228	150 ‡‡	232	226	230	229	321	328	319	323	40.7%
14	Taunton	Routes 24/140	60	22	23	28	24	48	49	36	44	82.2%
15	W. Bridgewater	Route 106 @ Elm Sq.	40	57	64	65	62	50	47	44	47	-24.2%
16	W. Bridgewater	Route 106/24	122	NA	NA	NA	NA	60	58	59	59	NA
		Total	2577	1824	1826	1853	1834	2146	2121	2138	2135	16.4%

‡ Counts were taken on 2/22/84
‡‡ Capacity is 450 as of 4/84

PARK AND RIDE FACILITIES
"BEFORE" AND "DURING"
S.E. EXPRESSWAY CONSTRUCTION
(SECOND YEAR)

CTPS
TABLE
4.2

No.	Town	Location	Capacity	Count 4/24/84	Count 4/25/84	Count 4/26/84	Average 1984	Count 5/21/85	Count 5/22/85	Count 5/23/85	Average 1985	Percent Change
1	Barnstable	Routes 6/132	225	192	170	171	178	202	209	195	202	13.7%
2	Bourne	Route 3 @ Sagamore Circle	400	259	237	262	253	231	254	246	244	-3.6%
3	Bridgewater	Route 24/ 104	60	34	44	37	38	33	31	40	35	-9.6%
4	Canton	Route 128 @ RR Station	725	545	561	597	568	588	573	618	593	4.5%
5	Canton	Routes 138/128 @ MDC Lot	100	34	37	48	40	23	24	33	27	-32.8%
6	Freetown	Route 24 @ Gramp Dean Rd.	30	15	17	14	15	18	16	17	17	10.9%
7	Hingham	Route 3A @ Hingham Shipyard	450	237	258	265	253	293	273	280	282	11.3%
8	Kingston	Routes 3A/53	100	82	81	84	82	97	97	92	95	15.8%
9	Milton	Houghton Pond Rd.	85	33	38	37	36	45	46	48	46	28.7%
10	Pembroke	Routes 3/139	85	16	14	14	15	26	25	25	25	72.7%
11	Plymouth	Route 3 @ Cherry St.	130	88	90	89	89	106	88	82	92	3.4%
12	Plymouth	Route 3 @ Longpond Rd.	65	8	9	9	9	5	3	4	4	-53.8%
13	Rockland	Routes 3/228	450	258	270	260	263	321	328	319	323	22.8%
14	Taunton	Routes 24/140	60	35	44	41	40	48	49	36	44	10.8%
15	W. Bridgewater	Route 106 @ Elm Sq.	40	62	61	54	59	50	47	44	47	-20.3%
16	W. Bridgewater	Route 106/24	122	18	24	27	23	60	58	59	59	156.5%
		Total	3127	1916	1955	2009	1960	2146	2121	2138	2135	8.9%

COMPARISON OF PARK AND RIDE FACILITY USE "DURING" SOUTHEAST EXPRESSWAY RECONSTRUCTION

CTPS

TABLE 4.3

3/Sagamore Circle lot in Bourne indicates an 8.3 percent reduction in daily use. This is equivalent to an average loss of 22 vehicles per day, the largest absolute total reduction in vehicle use at any one of the sites surveyed. Notably, the largest percent reduction in vehicle use (50.0%) appeared in Plymouth at the Route 3/Long Pond Road lot where a total of only four (4) vehicles per day were lost from active use.

4.3 INCREASED USE OF PARK AND RIDE LOTS

The use of available park and ride lot space is tabulated for each of the 16 sites in Table 4.4. The increased use of these lots is based in part on the shift of users from unidentified ad hoc facilities scattered throughout southeastern Massachusetts and on first time users responding to the incentives of new capacity and services at these sites. In the years preceding the Expressway reconstruction, the availability of formal commuter parking lot facilities was somewhat limited in areas southeast of Boston. Consequently, carpool and commuter bus staging areas were formed on an ad hoc basis in such areas as regional shopping centers and on vacant land near highway interchanges. As efforts were made to expand existing lots and to add new lots to the park and ride system, a portion of the users from ad hoc lots shifted to the formal lots in their area.

The presence of new expanded lots also drew first time users from other modes of travel and may have caused the dissolution of a few established carpools as new bus and vanpool staging opportunities became available at certain sites. It was therefore difficult to define the precise composition of new users found at sites from count surveys alone. In recognition of the need for more detailed information a mail-back survey of commuter parking lot users was distributed in late April, 1984.

4.4 ANALYSIS OF THE PARK AND RIDE USERS SURVEY

4.4.1 Survey Procedure and Results

A survey of park and ride users was conducted at all 16 lots on April 24-26, 1984. A one-page, postage-paid survey form was attached to the windshield of vehicles parked in the lots. Respondents filled out the questionnaires and returned them by mail. A sample of the questionnaire is displayed in Figure 4-2. A response rate of 41% was obtained with over 700 useful completed surveys, representing all lots in the study area. This sample represented approximately 36% of the total number of southeastern Massachusetts park and ride lot users.

The major findings of this survey are as follows:

- Almost 7% of those surveyed switched to park and ride lots from their previous choice of using the Southeast Expressway. This percentage is consistent with the percentage of new

No.	Town	Location	Usage 2/84	Capacity 2/84	Percent Used	Usage 4/84	Capacity 4/84	Percent Used	Usage 5/85	Capacity 5/85	Percent Used
1	Barnstable	Routes 6/132	180	225	80.1	178	225	79.0	202	225	89.8
2	Bourne	Route 3 @ Sagamore Circle	266	400	66.4	253	400	63.2	244	400	60.9
3	Bridgewater	Route 24/ 104	26	60	43.3	38	60	63.9	35	60	57.8
4	Canton	Route 128 @ RR Station	582	725	80.3	568	725	78.3	593	725	81.8
5	Canton	Routes 138/128 @ MDC Lot	34	100	34.3	40	100	39.7	27	100	26.7
6	Freetown	Route 24 @ Granp Dean Rd.	16	30	54.4	15	30	51.1	17	30	56.7
7	Hingham	Route 3A @ Hingham Shipyard	176	200	87.8	253	450	56.3	282	450	62.7
8	Kingston	Routes 3A/53	94	100	94.3	82	100	82.3	95	100	95.3
9	Milton	Hougton Pond Rd.	35	85	40.8	36	85	42.4	46	85	54.1
10	Pembroke	Routes 3/139	41	85	47.8	15	85	17.3	25	85	29.8
11	Plymouth	Route 3 @ Cherry St.	61	130	46.9	89	130	68.5	92	130	70.8
12	Plymouth	Route 3 @ Longpond Rd.	8	65	12.3	9	65	13.3	4	65	6.2
13	Rockland	Routes 3/228	229	150	152.9	263	450	58.4	323	450	71.7
14	Taunton	Routes 24/140	24	60	40.6	40	60	66.7	44	60	73.3
15	W.Bridgewater	Route 106 @ Elm Sq.	62	40	155.0	59	40	147.5	47	40	117.5
16	Bridgewater	Route 106/24	NA	122	0.0	23	122	18.9	59	122	48.4
		Total	1834	2577	71.2	1960	3127	62.7	2134	3127	68.3

PARK AND RIDE FACILITIES
CAPACITY ANALYSIS

CTPS
TABLE
4.4

Park and Ride User Survey

The Massachusetts Department of Public Works operates 37 Park and Ride lots in Eastern Massachusetts. This survey of parking lot users is being conducted in conjunction with the Southeast Expressway Reconstruction Project to gather information on the use of fringe parking lots, so that we may evaluate and improve our service.

PLEASE COMPLETE THIS QUESTIONNAIRE AND DROP IT IN ANY U.S. MAILBOX. POSTAGE HAS BEEN PRE-PAID.

A) BEFORE PARKING HERE TODAY, WHAT TOWN DID YOU COME FROM?

5 ☐☐☐☐☐☐☐☐☐☐☐☐

B) AT WHAT TIME DID YOU ARRIVE AT THIS LOT TODAY?

17 ☐☐ : ☐☐
(hr.) (min.)

C) HOW MANY PEOPLE RODE WITH YOU TO THIS LOT TODAY? 21 ☐☐
(place # here)

D) AFTER PARKING HERE, HOW DID YOU GET TO YOUR DESTINATION?

( )Carpool ( )Vanpool ( )Commuter Boat
( )Bus ( )Other _____
(please specify)

E) WHERE WAS THE DESTINATION OF YOUR TRIP? Print the name of the city/town (for Boston, include the neighborhood).

24 ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

F) WHAT WAS THE PURPOSE OF YOUR TRIP?

( )work ( )shopping ( )school ( )other _____
(please specify)

G) DURING THIS WEEK, HOW MANY DAYS WILL YOU USE THIS LOT? 44 ☐
(days)

H) BEFORE THE SOUTHEAST EXPRESSWAY RECONSTRUCTION BEGAN, HOW DID YOU MAKE THIS TRIP?

( ) I used this Park and Ride lot
( ) I used another parking lot. 46 ☐☐☐☐☐☐☐☐☐☐☐☐☐☐
_____ (please specify which one)
( ) I drove to my destination using the Southeast Expressway.
( ) Other _____
(please specify)

I) What changes, if any, would you like to see in the Park and Ride program? _____

_____

_____ 58 ☐☐☐☐

THANK YOU VERY MUCH FOR YOUR COOPERATION IN THIS SURVEY!

PARK AND RIDE USERS SURVEY FORM, APRIL 1984

CTPS FIGURE 4-2

users found in the counts of all lots where a 7% increase was found one month after the start of reconstruction.

- o Arrival times for surveyed lots show 53% of users arrive before 7:00 AM and 97% arrive before 9:00 AM.
- o The average auto occupancy rate is 1.48 passengers per vehicle arriving at the lots.
- o Of those using the lots, 27% proceed to their destinations in a shared-ride vehicle while another 68% reach their destination via transit.
- o Downtown Boston and its neighborhoods are the destination of 87% of lot users.
- o Almost 96% of the respondents use the lots for work trip purposes.
- o Most users (78.0%) park at the lots 5 days/week.
- o Suggestions for improvements include: better paving, markings, security, lighting and shelters.

4.4.2 Question-by-Question Breakdown

Question A: The origins of lot users are distributed, as would be expected, throughout southeastern Massachusetts and Cape Cod with clusters in the towns surrounding each lot. Most frequent origins were:

Westwood	19%
Dedham	15%
Canton	9%
Randolph	7%
All Rhode Island	5%
All other origins	45%

Question B: The time of arrival was distributed as follows:

6	AM or Before	14.4%
6-7	AM	38.2%
7-8	AM	33.7%
8-9	AM	10.9%
9-10	AM	1.6%
10	AM or After	1.2%

Question C: The average auto occupancy for vehicles arriving at all lots surveyed was 1.48 as compared with a regional average of 1.16 for all regional work trips and 1.60 for work trips into downtown Boston. The distribution of the number of passengers arriving to all lots was:

Drove alone	59.2%
Driver and 1 Passenger	34.4%
Driver and 2 Passengers	5.3%
Driver and 3 Passengers	0.9%
Driver and 4 or More Passengers	0.2%

This ratio varied greatly from lot to lot. The Hingham lot had the highest auto occupancy rate with 2.1 passengers per vehicle.

Question D: After parking in the park and ride lot, users reached their destinations by use of the following modes:

Bus	32.8%
Commuter Rail	22.0%
Vanpool	13.8%
Carpool	13.6%
Commuter Boat	13.0%
Other	4.5%

Question E: Of all lot users, 87% were destined for Boston and its neighborhoods; with 46% of all users going to the downtown financial district and Back Bay. Only 13% of park and ride users did not have final destinations in the downtown Boston area and 3.2% of all users were passing through Boston to Logan airport and South Station to reach out of state (New York, Washington, DC, Philadelphia and Wilmington) destinations.

Question F: The purpose of 95.5% of all trips was work or work-oriented, 1.45% were school trips, 0.5% were shopping trips and the remainder (2.6%) were for other diverse purposes.

Question G: The distribution of the days per week the lot was used was:

1 Day /week or less	4.0%
2 Days/week	3.6%
3 " "	6.4%
4 " "	6.7%
5 " "	78.0%
6 " "	0.8%
7 " "	0.1%

Question H: Nearly 7% of all park and ride users were new and switched from the Southeast Expressway. For those surveyed, this represents a total of 50 vehicles and 74 users. Users who switched lots did so to lots with expanded capacity or to the new West Bridgewater lot. The question results were:

"I used this lot."	81.8%
"I used another lot."	4.3%
"I drove on the Southeast Expressway"	6.9%
Other	6.5%

Question I: Nearly 50% of all survey respondents chose to leave this question blank. Of the remaining users, their summarized and edited comments appear below with a percentage of the respondents who expressed each comment. Each survey was coded for up to three comments. As a result, percentages given will total to more than 100 percent.

		% of all with Comments
1.	More/better shelters are needed.	31.0
2.	"I like the way it is."	25.9
3.	Better pavement surfaces needed.	23.5
4.	Better lighting needed.	16.1
5.	More security needed.	14.9
6.	Better transit service needed.	12.5
7.	More lots are needed.	8.3
8.	Better pavement markings needed.	8.3
9.	Keep the express lane after construction.	8.3
10.	More parking spaces needed in this lot.	8.0
11.	Reduce the transit costs.	6.9
12.	Change the linking transit service.	6.2
13.	Refreshments/coffee should be available.	5.5
14.	Better traffic control needed.	5.4
15.	"Don't start charging for parking."	2.9
16.	Better snow removal needed.	2.6
17.	Night time security needed.	2.1
18.	Better communications between riders.	2.1
19.	Pay phone needed.	2.0
20.	Improve handicapped spaces.	1.0

4.5 CONCLUSIONS FROM LOT COUNTS AND SURVEYS

Based on the findings of the users survey and on the results of vehicle counts, the expansion of the park and ride capacity did not attract significant numbers of vehicles from the Expressway on a permanant basis. First time users were attracted to the facilities in direct response to the start of reconstruction. As travel conditions stablized on the Expressway, users of less preferable ad hoc facilities began to shift into the newly available space.

5. Rapid Transit

CHAPTER 5: RAPID TRANSIT

5.1 INTRODUCTION

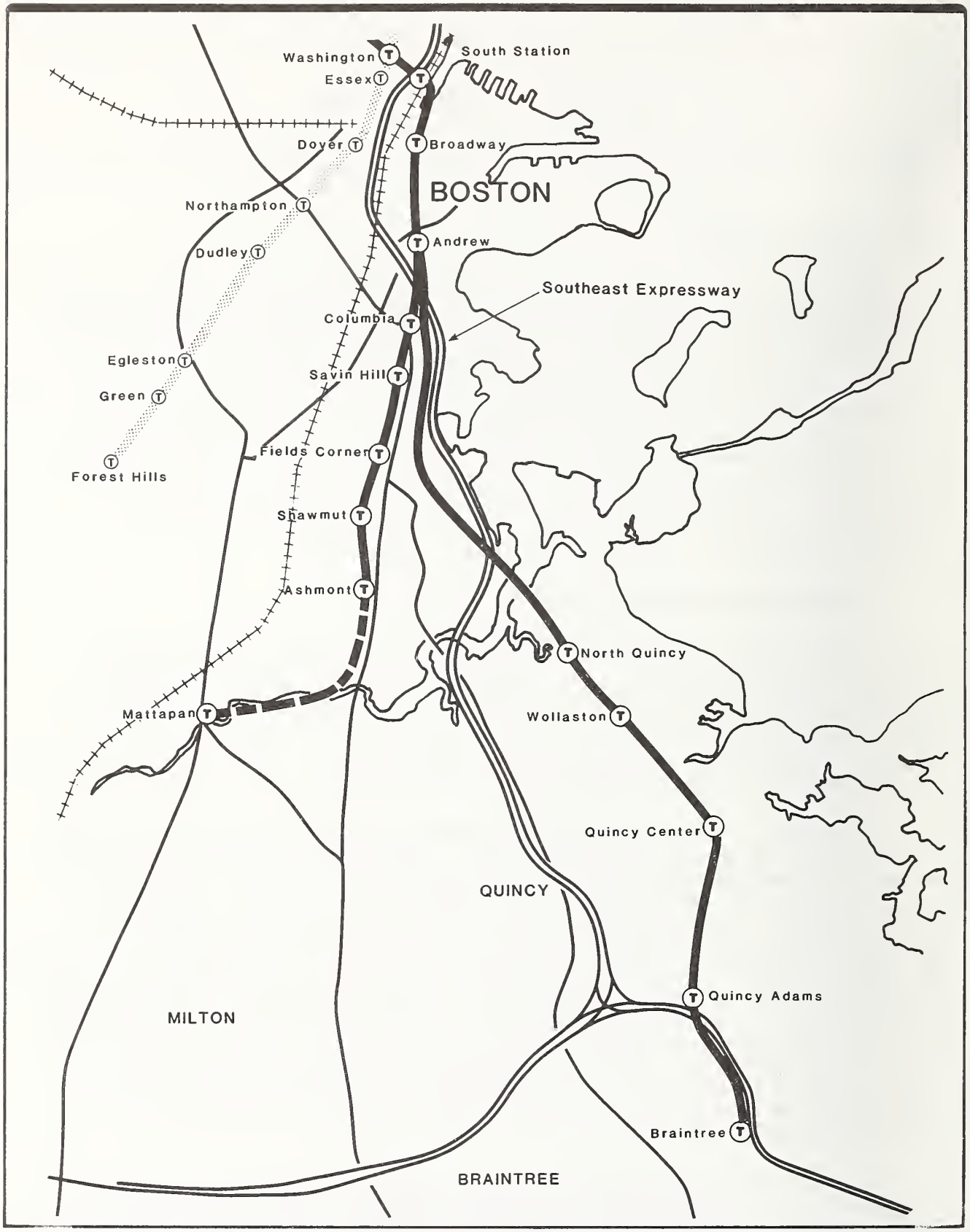
The Southeast Expressway corridor is served by several rapid transit stations (see Figure 5-1). Several types of data were collected to ascertain the effects of Expressway reconstruction on rapid transit ridership. During the first year of the reconstruction project, AM peak boarding counts were collected at five Red Line stations and vehicle counts at station parking facilities during the morning peak period. Less extensive data of the same type were also collected at the Forest Hills Station, while only boarding counts were obtained at the Ashmont Branch stations. During the second reconstruction phase, total passenger estimates were supplied by the MBTA, as were total vehicle volumes at station parking facilities.

5.2 BOARDINGS AT RAPID TRANSIT STATIONS

The number of persons entering each of the five stations - Braintree, Quincy Adams, Quincy Center, Wollaston, and North Quincy - was recorded every fifteen minutes during the AM peak period on one day each in January and February; three days in March; three days in April; and one day each in May and June. The data for March and April were summed and averaged to obtain a representative AM peak period for each month.

Changes in ridership were determined by comparing observed ridership with expected ridership. Expected ridership was determined by summing and averaging January and February 1982 (the latest year for which data were available) weekday ridership for each station and calculating the ratios of weekday ridership during each of the remaining months to the average January/February weekday ridership. These ratios were applied to average January/February 1984 ridership to obtain expected average weekday AM peak ridership. Since there is no historical information on Quincy Adams ridership, the line ratio was used to determine expected ridership. The line ratio was also used to determine expected ridership at the North Quincy station because January 1982 ridership was influenced by the laying of track on the Ashmont branch.

As can be seen from Table 5.1, 1984 AM peak ridership was at expected levels in March; 4 percent higher in April; 4 percent lower in May; and was as expected in June. There was also much variation among stations. There was no change in ridership at



	LOCATION OF THE SOUTH SHORE RED LINE EXTENSION AND SOUTH STATION	CTPS FIGURE 5-1

	Expected Ridership	Average Observed Ridership	Change #	Change %
	March 1984			
Braintree	3,500	3,500	0	0
Quincy Adams	1,300	1,500	+200	(+15%)
Quincy Center	3,100	3,600	+500	(+16%)
Wollaston	3,100	2,600	-500	(-16%)
North Quincy	2,800	2,600	-200	(- 7%)
Total	13,800	13,800	0	(0%)
	April 1984			
Braintree	3,500	3,500	0	0
Quincy Adams	1,300	1,500	+200	(+15%)
Quincy Center	3,100	3,900	+800	(+26%)
Wollaston	2,900	2,600	-300	(-10%)
North Quincy	2,800	2,700	-200	(- 4%)
Total	13,600	14,200	+600	(+ 4%)
	May 1984*			
Braintree	3,100	2,900	-200	(- 6%)
Quincy Adams	1,200	1,200	0	(0%)
Quincy Center	2,600	3,000	+400	(+15%)
Wollaston	3,100	2,500	-600	(-19%)
North Quincy	2,500	2,400	-100	(- 4%)
Total	12,500	12,000	-500	(- 4%)
	June 1984*			
Braintree	3,500	3,000	-500	(-14%)
Quincy Adams	1,200	1,000	-200	(-17%)
Quincy Center	2,600	3,700	+1,100	(+42%)
Wollaston	2,800	2,600	-200	(- 7%)
North Quincy	2,500	2,300	-200	(- 8%)
Total	12,600	12,600	0	(0%)

*One observation only

SOUTH SHORE RED LINE
EXTENSION AM PEAK RIDERSHIP
DURING FIRST RECONSTRUCTION PHASE

CTPS
TABLE
5.1

the Braintree station during March and April 1984. However, ridership decreased by six percent in May and by 14 percent in June. Ridership at the Quincy Adams station increased by 15 percent in both March and April, returned to normal in May, and decreased by 17 percent in June. The Quincy Center station is the only one that experienced gains in each month (+16 percent in March, +26 percent in April; +15 percent in May; and +42 percent in June). Ridership at Wollaston and North Quincy (the stations closest to Boston) was lower than expected during each month (-16 percent at Wollaston and -7 percent at North Quincy during March; -10 percent at Wollaston and -4 percent at North Quincy during April; -19 percent at Wollaston and -4 percent at North Quincy during May; and -7 percent at Wollaston and -8 percent at North Quincy during June).

Between May 1984 and May 1985, the MBTA reported a 6.8 percent increase in weekday ridership on the Red Line, an absolute increase of approximately 1,700 passengers per day at the five stations (see Tables 5.2 and 5.3). The Quincy Adams station serviced the largest portion of the increase, 1,350 passengers per average weekday, about a 30 percent increase over the period. The Braintree station also experienced new patronage demands of 17 percent on average. Ridership at the remaining stations varied less.

Several factors contributed to these ridership increases. The primary attraction appears to have been the availability of relatively new service and parking space at the Quincy Adams Station which opened in December of 1983. Growth in metropolitan area travel demand also had an impact on the increased patronage, but the coincidence of station location and concentration of growth at Braintree and Quincy Adams indicates that Expressway conditions most likely influenced rider choices.

5.3 UTILIZATION OF PARKING FACILITIES AT RAPID TRANSIT STATIONS

The number of vehicles using the various parking facilities associated with the five Red Line stations were counted and their license plate numbers were recorded on February 29, 1984 (Braintree was recounted on March 15th because of problems with the data) and on May 10, 1984. The results are shown in Table 5.4. The Braintree garage and the Wollaston lot continued at capacity during the morning peak. However, they appeared to reach capacity later in the morning. On the "before" day, the Braintree garage reached capacity at approximately 7:40 AM and the Wollaston lot at approximately 8:05 AM. On the "during" day, they closed at approximately 8:15 AM and 9:00 AM respectively.

In May 1985, parking lot management companies reported a 9.5 percent increase in total vehicle volume over the same time period in May, 1984 (see Tables 5.5 and 5.6). Because both months had the same number of weekdays (22), total and average weekday volumes are directly comparable. The fact that there was

	Year	Weekday Totals	Saturday Totals	MON-SAT Totals	Weekday Average	Saturday Average
North Quincy	May/ 1984	103081	5917	108998	5425	1972
	May/ 1985	100295	4889	105184	5572	1630
	% Diff.	-2.70%	-17.37%	-3.50%	2.71%	-17.34%
Wollaston	May/ 1984	72250	4664	76914	3803	1555
	May/ 1985	66189	5421	71610	3677	1807
	% Diff.	-8.39%	16.23%	-6.90%	-3.31%	16.21%
Quincy Adams	May/ 1984	86962	7917	94843	4575	2639
	May/ 1985	106760	7844	114604	5931	2615
	% Diff.	22.77%	-0.92%	20.84%	29.64%	-0.91%
Braintree	May/ 1984	70687	7005	77992	3736	2335
	May/ 1985	78677	N/A	N/A	4371	N/A
	% Diff.	10.83%	N/A	N/A	17.00%	N/A
Quincy Center	May/ 1984	136697	15502	152199	7194	5167
	May/ 1985	123434	12826	136260	6857	4275
	% Diff.	-9.70%	-17.26%	-10.47%	-4.68%	-17.26%
Daily Totals	May/ 1984	469931	41005	510936	24733	13668
	May/ 1985	475355	N/A	N/A	26409	N/A
	% Diff.	1.15%	N/A	N/A	6.78%	N/A

RED LINE MAY 1984 - MAY 1985
RIDERSHIP COMPARISON

CTPS
TABLE
5.2

	Year	Weekday Totals	Saturday Totals	MON-SAT Totals	Weekday Average	Saturday Average
North Quincy	May/ 1984	103081	5917	108998	5425	1972
	May/ 1985	100295	4889	109184	5572	1630
	Change	-2786	-1028	-814	147	-342
Wollaston	May/ 1984	72250	4664	76914	3803	1555
	May/ 1985	66189	5421	71610	3677	1807
	Change	-6061	757	-5304	-126	252
Quincy Adams	May/ 1984	86962	7917	94843	4575	2639
	May/ 1985	106760	7844	114604	5931	2615
	Change	19798	-73	19761	1356	-24
Braintree	May/ 1984	70987	7005	77992	3736	2335
	May/ 1985	78677	N/A	N/A	4371	N/A
	Change	7690	N/A	N/A	635	N/A
Quincy Center	May/ 1984	136687	15502	152189	7194	5167
	May/ 1985	123434	12826	136260	6857	4275
	Change	-13253	-2676	-15929	-337	-892
Daily Totals	May/ 1984	469931	41005	510936	24733	13668
	May/ 1985	475355	N/A	N/A	26409	N/A
	Change	5424	N/A	N/A	1676	N/A

RED LINE MAY 1984 - MAY 1985
TOTAL RIDERSHIP COMPARISON

CTPS
TABLE
5.3

	2/29/84	5/10/84	Official Parking Capacity
Braintree			
- multi-level parking garage	1,240*	1,124	1,100
- parking lot	249	309	-
Quincy Adams			
- multi-level parking garage	940	1,163	2,000
Quincy Center			
- multi-level parking garage	329**	558	850
Wollaston			
- parking lot	500	518	500
North Quincy			
- 2 parking lots	903	937	850

*Count was made in March.

**Faulty data. Was probably undercounted.

USE OF PARKING FACILITIES
AT RED LINE STATIONS
"BEFORE" AND "DURING"
THE FIRST RECONSTRUCTION PHASE

CTPS
TABLE
5.4

	Year	Weekday Totals	Saturday Totals	MON-SAT Totals	Weekday Average	Saturday Average
North Quincy (Hancock)	May/ 1984	13746	314	14060	625	79
	May/ 1985	16990	474	17464	772	119
	% Diff.	23.60%	50.96%	24.21%	23.52%	50.63%
North Quincy (Newport)	May/ 1984	4912	67	4979	223	17
	May/ 1985	7363	61	7424	335	15
	% Diff.	49.90%	-8.96%	49.11%	50.22%	-11.76%
Wollaston	May/ 1984	11050	248	11298	502	62
	May/ 1985	11854	440	12294	539	110
	% Diff.	7.28%	77.42%	8.82%	7.37%	77.42%
Quincy Adams	May/ 1984	26215	962	27177	1192	241
	May/ 1985	31319	1053	32372	1424	263
	% Diff.	19.47%	9.46%	19.12%	19.46%	9.13%
Braintree	May/ 1984	28197	1171	29368	1282	293
	May/ 1985	25597	1239	26836	1164	310
	% Diff.	-9.22%	5.81%	-8.62%	-9.20%	5.80%
Quincy Center	May/ 1984	11060	310	11370	503	78
	May/ 1985	11121	329	11450	506	82
	% Diff.	0.55%	6.13%	0.70%	0.60%	5.13%
Daily Totals	May/ 1984	95180	3072	98252	4326	768
	May/ 1985	104244	3596	107840	4738	899
	% Diff.	9.52%	17.06%	9.76%	9.52%	17.06%

RED LINE MAY 1984 - MAY 1985
TOTAL CAR COMPARISON
- PERCENT DIFFERENCE

CTPS
TABLE
5.5

	Year	Weekday Totals	Saturday Totals	MON-SAT Totals	Weekday Average	Saturday Average
North Quincy (Hancock)	May/ 1984	13746	314	14060	625	79
	May/ 1985	16990	474	17464	772	119
	Change	3244	160	3404	147	41
North Quincy (Newport)	May/ 1984	4912	67	4979	223	17
	May/ 1985	7363	61	7424	335	15
	Change	2451	-6	2445	112	-2
Wollaston	May/ 1984	11050	248	11298	502	62
	May/ 1985	11854	440	12294	539	110
	Change	804	192	996	37	48
Quincy Adams	May/ 1984	26215	962	27177	1192	241
	May/ 1985	31319	1053	32372	1424	263
	Change	5104	91	5195	232	22
Braintree	May/ 1984	28197	1171	29368	1282	293
	May/ 1985	25597	1239	26836	1164	310
	Change	-2600	68	-2532	-118	17
Quincy Center	May/ 1984	11060	310	11370	503	78
	May/ 1985	11121	329	11450	506	82
	Change	61	19	80	3	4
Daily Totals	May/ 1984	95180	3072	98252	4326	769
	May/ 1985	104244	3596	107840	4738	899
	Change	9064	524	9588	412	131

RED LINE MAY 1984 - MAY 1985
TOTAL CAR COMPARISON
- ABSOLUTE DIFFERENCE

CTPS
TABLE
5.6

an increase in total vehicle volume supports the findings from the first year that space was available for a longer period in the morning and that commuters were not having to compete for space. As was the case with ridership, gains were greatest at the Quincy Adams station. However, the Braintree station reported a decline in total volume between the 1984 and 1985 construction seasons. It is likely that, since this facility usually fills to capacity, that the reduction in total vehicle volume (without any reduction in ridership) was due to the increased presence of long-term parkers. This condition forced shorter-term users to shift to other facilities which, in part, explains the increase in over capacity use of North Quincy lots and some portion of the increase at Quincy Adams. These shifts were noted in the initial "before" and "during" license plate survey where users were found to shift among lots in response to changing demands.

5.4 BOARDINGS AT ASHMONT BRANCH STATIONS

The number of persons entering each of the five stations on the Ashmont branch of the Red Line (Ashmont, Shawmut, Fields Corner, Savin Hill, and JFK/UMass) was recorded every 15 minutes during the AM peak on one day in early March, 1984 and again on one day in early April, 1984. Counts were taken at the Ashmont station on two additional days after the Expressway work was begun. The results of these counts are presented in Table 5.7. The "during" counts for Ashmont station represent averages of the three observations. All numbers have been adjusted to reflect monthly variations in boardings by using 1982 boarding indices. From the Table, it appears that total ridership decreased by two percent. Ridership increased at the Shawmut, Fields Corner and JFK/UMass stations and decreased at the Ashmont and Savin Hill stations. It is important to note that the "before" data were collected on one day only. Therefore, it is difficult to be conclusive about changes in ridership.

5.5 BOARDINGS AT THE FOREST HILLS STATION

The number of persons entering the Forest Hills Station on the Orange Line was recorded at 15-minute intervals during the morning peak period in early March and again in early May. The results, adjusted to reflect monthly variation, show that 4,900 persons entered the station during the AM peak on both the before and during observation days.

5.6 FINDINGS AND CONCLUSIONS

- After the reconstruction began, total Red Line ridership initially stayed at normal levels; increased by 4 percent in April; decreased by 4 percent in May; and returned to normal in June.

- Although in the aggregate first year ridership was stable, individual stations showed ridership fluctuations.

	Before	During	Change	
Ashmont	5,200	4,900	-300	(-6%)
Shawmut	800	1,100	+300	(+37%)
Fields Corner	1,600	1,700	+100	(+6%)
Savin Hill	1,000	700	-300	(-30%)
JFK/UMass	600	700	+100	(+17%)
Total	9,100*	8,900*	-200	(-2%)

*Does not include boardings between 8:15 and 8:30 AM at Fields Corner.

ASHMONT BRANCH RIDERSHIP
BEFORE AND DURING
EXPRESSWAY RECONSTRUCTION

CTPS
TABLE
5.7

- Ridership at the Quincy Center station was higher than expected during each of the three months after reconstruction started.

- Ridership at the Wollaston station was lower than expected after reconstruction began.

- During the second year of reconstruction, average weekday ridership increased by 6.8 percent and was concentrated at two stations (Braintree and Quincy Adams) situated at the southern terminus of the project. It is likely that Expressway travel conditions influenced the new riders.

- Lower turnover rates at the Braintree parking garage during the second year indicated the presence of more long-term "all day" parkers in the mix of new station users. The availability of additional parking space at Quincy Adams provided a complementary attraction to its location contributing to a large ridership increase.

- There were no significant changes in ridership on the Ashmont branch of the Red Line and at the Forest Hills station on the Orange Line.

6. Commuter Rail

CHAPTER 6: COMMUTER RAIL

6.1 INTRODUCTION

Because of the reconstruction project, the MBTA implemented new schedules on its Attleboro, Stoughton, Framingham, and Franklin commuter rail routes, effective March 12, 1984. Of these four routes, the Stoughton and Attleboro routes were closest to the area that was expected to be most influenced by the Expressway project. Residents of the Franklin branch corridor use the Expressway to a limited extent, but can reach the Massachusetts Turnpike Extension (which also connects to the Boston CBD), about as easily as the Expressway. Use of the Expressway by residents of the Framingham branch corridor was considered negligible. Because ridership counts require a substantial amount of staff time, commuter rail counts were limited to the Stoughton and Attleboro routes. During the second phase of reconstruction, riders of the Stoughton and Attleboro routes were surveyed to determine how the reconstruction influenced decisions to use commuter rail.

6.2 BEFORE AND DURING PASSENGER COUNTS

6.2.1 Procedure

Boarding counts were made for all trains scheduled to depart either Attleboro or Stoughton prior to 9:00 AM on a weekday. This corresponds with the definition of "peak" trains used by the Boston & Maine Corporation in reports to the MBTA. All counts were taken on station platforms. Two counters were assigned to each station except Canton Centre which has relatively low ridership. To the extent possible, the same counters were assigned to the same stations for before and during counts. After the last peak train departed, license plate numbers of all cars parked in station lots, or outside lots but appearing to belong to commuters, were recorded.

All "before" counts were done on Wednesday, March 7, 1984, except for the Route 128 station which was counted on Wednesday, February 15, as part of an earlier project. All "during" counts were done on Tuesday, April 10, 1984. All stations on the Stoughton and Attleboro lines were counted except for Fairmount and Attleboro. Fairmount was excluded because it is used primarily by residents of a section of Boston for which the Expressway is not a convenient alternative. Attleboro was not included because commuter rail already appeared to have captured

most of the market from the Attleboro area even before the Expressway work began. Commuter parking lots at Attleboro were filled nearly to capacity by 9:00 AM during a check made by CTPS in November 1983.

6.2.2 Representativeness of Data

Ridership on commuter rail lines, as on other modes, varies from day to day. Many of these variations are for reasons known only to individual passengers, so it is impossible to plan for them. Some conclusions about overall ridership patterns can be drawn from the daily headcount reports made by train conductors. Published summaries of these reports show only total ridership for peak and off-peak trains by direction. There is no separation by individual train, and boardings at specific stations are not recorded.

Data from February, March, and April 1983 indicate that ridership during most weeks on the Attleboro and Stoughton lines is highest on the first three days of the week, slightly lower on Thursday, and lowest on Friday. All counts were taken on Tuesdays or Wednesdays. From February through April 1983, ridership on Tuesdays fluctuated within 3% above or below the overall Tuesday average, except for one Tuesday during a school vacation week when ridership was 6% below average. Wednesday ridership generally varied from 3% above to 2% below average. In most weeks, Tuesday and Wednesday ridership differed by no more than 2%.

If "before" counts were taken on a day with below-average ridership, and "during" and "after" counts on a day with above-average ridership, then the ridership increase would be overstated. Conversely, an above-average before count and a below-average during count would understate ridership gains. Conductors' reports for the week of the "before" count show more day-to-day variation than usual on the Attleboro and Stoughton lines, but that Wednesday, the count day, was closest to the average for that week.

In 1983, ridership on the Attleboro and Stoughton lines was about 2% higher in February and April than in March. Conductors' reports from February and March 1984 prior to the schedule change indicate a similar drop-off. If this was followed by a recovery similar to 1983, then in the week of the "during" counts, ridership would have been about 2% higher than in the "before" counts even without the service changes and the Expressway project.

6.2.3 Results

Ridership at all stations included in the "before" and "during" counts appears in Tables 6.1 and 6.2. Overall peak boardings at the six stations increased by 367 between the two

Train Number	Arrive South Station	Station Mansfield	Sharon	Stoughton	Canton Center	Canton Junction	Route 128	Train Boardings
300	6:45	105	68			111	32	316
802	7:15			165	42	192	75	474
302	7:45	185	226			236	144	791
304	8:00	289	164					453
804	8:14			191	58	179	139	567
306	8:47	91	104			74	137	406
308	9:20	27	43			39	63	172
Station Boardings		697	605	356	100	831	590	3179
Parked Cars		472	417	221	18	515	605	2248

COMMUTER RAIL
ATTLEBORO LINE
A.M. BOARDINGS AND PARKED CARS (3/7/84)

CTPS
TABLE
6.1

Train Number	Arrive South Station	Station Mansfield	Sharon	Stoughton	Canton Center	Canton Junction	Route 128	Train Boardings
8106	6:50	116	82			125	38	361
8910	7:18			191	50	205	96	542
8112	7:35	202	176					378
8914	7:50			169	47	207	168	591
8114	7:58	191	227					418
8118	8:18	112				161		273
8920	8:24			184	49		151	384
8124	8:44	82	114			64		260
8926	8:52			27	10		119	156
8130	9:20	51	48			35	49	183
Station Boardings		754	647	571	156	797	621	3546
Parked Cars		473	455	338	62	498	613	2439

COMMUTER RAIL
ATTLEBORO LINE
A.M. BOARDINGS AND PARKED CARS (4/10/84)

CTPS
TABLE
6.2

counts. Five of the stations had increases ranging from 31 to 215 passengers. Canton Junction lost 34 riders. The largest increase was 215 passengers at Stoughton.

Stoughton and Canton Centre had the largest service increase, going from two to four peak trains. Eighty percent of the new ridership at the two stations was on the first of the new trips, which departed Stoughton at 7:15 and Canton Centre at 7:22 and arrived at South Station at 7:50. Under the old schedule, the two stations were served by trains which arived at South Station at 7:15, and 8:14. These were changed to 7:18 and 8:24. People in the Stoughton Branch service area who wanted an arrival time close to but not later than 8:00 previously had the option of going to the Main Line to take Train 302. This train stopped at Sharon at 7:14, and Canton Junction at 7:19, and arrived at South Station at 7:45.

Under the new schedule, Train 302 was replaced at Sharon by service which stopped there at 7:07, did not stop at Canton Junction, and arrived at South Station at 7:35. The CTPS counts showed 50 fewer passengers using the new service at Sharon than had used Train 302, but all other Sharon trains showed ridership increases. It is likely that the lost riders were diverted to Stoughton. Furthermore, based on the gains on other Sharon trains there were probably at least 15 new riders on the new train at Sharon, making the actual diversion to Stoughton at least 65.

Under the new schedule, Train 302 was replaced at Canton Junction by Train 8914 which stops there at 7:25. The CTPS counts show 29 fewer passengers used Train 8914 at Canton Junction than had used Train 302. It is likely that these passengers were diverted to either Canton Centre or Stoughton. It is also likely that there were at least 10 new riders at Canton Junction on Train 8914, making the actual diversions at least 39. It appears, therefore, that of the 216 "new" riders at Stoughton and Canton Centre on Train 8914, at least 104 were really old commuter rail riders diverted from Sharon or Canton Junction.

The last three peak trains stopping at Canton Junction all had fewer passengers on April 10 than on March 7, with a combined loss of 32 riders. The loss of 10 riders from Train 8124 compared with former Train 306, both departing at 8:21, would be partly attributable to diversions to new Train 8926 at Stoughton and Canton Centre. There was very little change in the arrival and departure times of the other two Canton Junction trains, and no change in nearby competing service, however. The losses appear, ironically, to be attributable to improvements made in the west side parking lot at Canton Junction. On March 7, parking rows were not well delineated, and cars were parked wherever there was room in the lot. On April 10, rows were marked by lines of railroad ties. The April 10 count showed 32 fewer cars

at Canton Junction at 9:00 AM than there were on March 7, but there were no vacant spaces.

Some of the 18 riders lost from Train 8118 may have been among the 12 new riders on Train 8920 at Route 128. The last two peak trains at Route 128 had a net loss of 32 riders. It is likely that some of the 18 riders lost at Route 128 on Train 8926 compared to former Train 306 were among the 37 new riders on Train 8926 at Stoughton and Canton Centre. There was no net increase in the number of trains at Route 128. Most trains departed several minutes later than the trains they replaced, and had correspondingly later Boston-arrival times. This may have resulted in loss of some previous riders with inflexible arrival time needs. As discussed later, it appears likely that some of the Route 128 ridership change occurred between February 15 and March 7, rather than between March 7 and April 10.

The only Main Line station included in the counts where there was an increase in service was Mansfield. Under the new schedule, Train 8118 gave Mansfield an 8:18 Boston arrival. The nearest choices previously were 8:00 and 8:47. Passengers still had a choice of 7:58 or 8:44 as well as 8:18. The CTPS counts showed 112 passengers on the new train. The preceding train lost 98 riders, however, and the following train lost nine, so it appears that no more than five of the users of the extra Mansfield trip were actually new commuter rail riders. The other three Mansfield trains showed ridership increases ranging from 11 to 24. The total peak period gain at Mansfield was 57 passengers.

As explained previously, counts were not taken at either Attleboro or Fairmount. The change in service at Attleboro was the same as that at Mansfield. The Mansfield license plate check found a net increase of only one parked car compared to 57 new riders. Parking constraints at Attleboro would similarly limit ridership gains to walk-ins and drop-offs. The number of Attleboro residents working in Boston is only about one-third the number of Mansfield residents working in Boston. In past counts, Attleboro has always had fewer total riders than Mansfield. It is likely, therefore, that a count at Attleboro would show no more new riders than the number at Mansfield, or about 60.

At Fairmount Station, the new peak schedule is similar to the old one, except that trains stopping at Fairmount before 9:00 AM now arrive in Boston three to five minutes later than before. The improvement in service at Fairmount consists of the provision of more seating capacity. Some trains previously had only standing room at Fairmount.

The most recent detailed ridership count at Fairmount available to CTPS was taken by the Boston and Maine Railroad Company (B&M) on April 7, 1983. It showed 629 boardings in the morning

peak, and 701 all day. A less detailed count by the B&M on November 17, 1983, showed only 659 Fairmount riders, or a loss of 72 from the previous count. Ridership was less than the total at any of the other Main Line stations from Attleboro to Route 128. Fairmount has very limited parking capacity. Ridership gained at Fairmount, as a result of the new schedule and the Expressway project, is probably no greater than the gains at Route 128, Sharon, and Mansfield, or on the order of 30 to 60 passengers.

6.2.4 Summary

The CTPS commuter rail passenger counts found 357 more passengers boarding peak-period inbound trains on April 10, 1984, than there were on March 7. The counts included all stations on the Attleboro and Stoughton routes, with the exception of Attleboro and Fairmount. Based on known information about these two stations, and on the experience at other stations, they are likely to have gained a combined total of no more than 120 new riders, making the grand total gain for the two routes at most 477 riders.

Conductor headcount reports show that total peak ridership on the Attleboro and Stoughton lines during the week of the March 7 count was about 260 less than it had been three weeks earlier, or a decline of 5%. This was the same as the pattern in 1983. No details of changes at individual stations are available. If the losses were uniform, then Route 128 ridership would have been about 30 less on March 7 than on February 15, raising the ridership increase between March 7 and April 10 to 507.

In 1983, mid-week ridership in the week including April 10 was 2% higher than in the week including March 7. Without service changes and the Expressway reconstruction, it is likely that a similar pattern would have recurred in 1984. Therefore, about 65 of the new passengers counted on April 10 could have been expected to be there anyway. In addition, 25 of the new riders assumed at Attleboro, Fairmount and Route 128 could have been expected anyway.

In March and April 1983, ridership averaged 1% higher on Tuesdays than on Wednesdays. In March 1984, the differential was 2%-3%. Since April 10 was a Tuesday and March 7 was a Wednesday, at least 50 passengers should be deducted from the April 10 counts for comparable results.

In summary, the best estimate of the ridership impact of new service and Expressway reconstruction appears to be as follows:

357	increase in riders counted at six stations
+120	high side allowance for new riders at Attleboro and Fairmount

+30 adjustment to make Route 128 comparable with other counts

-90 normal increase between March and April

-50 normal differential of Tuesday vs. Wednesday

367 Net Result

An unadjusted total of 420 new riders were estimated from the ridership survey (refer to section 6.4) conducted during the second year of reconstruction.

6.3 LICENSE-PLATE MATCHING FOR COMMUTER RAIL STATION COUNTS

6.3.1 Procedure

This section supplements the information found in the previous section on passengers boarding at stations on the Attleboro and Stoughton commuter rail lines (these stations including Mansfield, Sharon, Canton Junction, Rte. 128, Stoughton, and Canton Centre). As part of the count effort, the license plate numbers of all cars parked at the six study stations were recorded. License numbers in the "before" and "during" counts were matched against each other and against files obtained from the Massachusetts Registry of Motor Vehicles. Tables were produced showing, by town of origin, the number of cars parked at each station in the "before" and "during" counts, the number of cars shifted from each station to each other station, and the number appearing in only a "before" count or a "during" count, but not both. For purposes of this analysis, "cars" includes non-commercial vans and pick-up trucks.

6.3.2 Registry File Match

At the six stations combined, 2,249 license numbers were recorded in the "before" counts and 2,439 in the "during" counts. This was a 100% sample of cars parked in official station parking areas. In certain cases, cars parked on adjacent streets, but evidently belonging to commuters, were also recorded.

Of the 2,249 vehicles in the "before" counts, 2,141 or 95% were registered in Massachusetts, 69 in Rhode Island, and 39 in other states. Of the Massachusetts plates, 1,806 or 84.4% matched records in the Registry files. This is within the expected matching range for such counts. The Registry files available to CTPS were updated only through the end of 1983. Any vehicles registered after that would not be included in the files. Some unmatched plates were a result of errors in recording license numbers at the stations or errors in entering data from the counters' worksheets into the computer.

Of the 2,439 vehicles in the "during" counts, 2,329 or 95% were registered in Massachusetts, 73 in Rhode Island, and 37 in other states. Compared to the "before" counts, this was an increase of 188 Massachusetts and four Rhode Island vehicles and a decrease of two from other states. Of the Massachusetts plates, 1,914 or 82.2% matched records in the Registry files, or slightly less than the match rate for "before" counts. Of the 335 "before" and 415 "during" count Massachusetts plates not matching Registry records, 154 were observed in both counts. The probability of repeating the same error in two counts is fairly low, so all, or most, of these consisted of new registrations since the file was updated. This leaves roughly 8% of "before" plates and 11% of "during" plates both unmatched and potentially in error.

Most passengers using the stations in the counts would have boarded northbound commuter trains except at Route 128 station, which also serves passengers taking southbound Amtrak trains. Excluding results from the Route 128 station, which has a large market attraction area, about 4% of the vehicles in each count originated at locations from which passengers would not logically use the station on a regular basis. For example, a car registered in Newburyport, RI recorded at Canton Junction, MA is illogical. Possible reasons for such illogical observations include passengers moving after the Registry file was updated, passengers staying temporarily at a location other than principal residence, or errors in recording or processing of license numbers.

6.3.3 Changes in Parked Cars from "Before" to "During" Counts

Table 6.3 shows, for each station in the counts, the number of license plates recorded at the same station in both counts, the number shifted to or from each other station, the number observed before only, and the number observed during only.

The "before" and "during" counts were taken five weeks apart, except at Route 128, where the interval was eight weeks. Route 128 would be expected to have a high passenger turnover rate, because intercity Amtrak trips would not be repeated on a regular basis. Parking is not separated for commuters and Amtrak passengers. Only 35% of "before" count cars at Route 128 were also there in the "during" count. Other stations might be expected to have little change in the identity of parked cars, but only 53% of cars recorded in the "before" counts at the other five stations combined were recorded at the same station in both counts. An additional 4.4% of "before" vehicles switched to different stations in the "during" counts. This leaves 43% of "before" vehicles not found in "during" counts, despite an overall increase of 8% in parked vehicles.

According to a 1975 commuter rail survey, 91.4% of peak-period Southside commuter rail riders used the service daily. If this percentage still holds, then the fact that "before" counts were done on a Tuesday and "during" counts on a Wednesday would, at most, account for a turnover of 8.6%.

Station Before	Station During: Stoughton	Canton Centre	Mansfield	Sharon	Canton Junction	Route 128	Not Found	Total Before
Stoughton	118	1	-	-	4	1	98	222
Canton Centre	-	10	-	-	1	-	7	18
Mansfield	1	-	234	2	1	9	225	472
Sharon	3	-	1	251	1	4	157	417
Canton Junction	14	20	3	5	253	2	218	515
Route 128	6	-	5	2	7	213	372	605
Not Found	197	31	228	193	232	386		
Total During	339	62	471	453	499	615		

Total cars observed at six stations before = 2,249
Total cars observed at six stations during = 2,439

Total cars observed before only = 1,077
Total cars observed during only = 1,267

SHIFT OF RECORDED LICENSE PLATES
BETWEEN BEFORE AND DURING COUNTS

CTPS
TABLE
6.3

Excluding Route 128 station results, the boarding counts taken on the same days as the license plate surveys show an overall ratio of total passengers to parked cars of 1.6. Those who did not drive used other access modes, including riding as passengers in the vehicles that were parked at stations, being dropped off, and walking. Passengers may change their access modes depending on their schedules and the available options on a given day. Also, in multiple-car families, the vehicle driven to a railroad station may not always be the same. Some cars may have re-registered between the two counts. Finally, some cars actually parked at stations during both counts may not have appeared as such because of errors in recording or processing license numbers in one count or the other. For all of these reasons, the proportion of "before" passengers not travelling on the day of the "during" counts was likely much lower than the 43% disappearance rate for parked vehicles.

To test the importance of multiple-car families in auto turnover rates, street addresses for all cars registered in Canton, and either recorded at Canton Junction in the before count and nowhere in the during counts, or at Canton Junction in the during count and nowhere in the before counts were obtained from Registry files. Only 10% of the "before-only" cars had addresses identical to "during-only" cars. About 75% of the before-only cars were registered at addresses within one mile of either Canton Junction Station or Canton Center station. Therefore, the likelihood of potential passengers having shifted from driving autos to walking or being dropped off is high. Because of substantial data processing requirements, no examination was made of addresses of before-only or during-only cars registered in other towns.

The origins of parked cars in "before" and "during" counts are much more consistent at the town level than at the individual vehicle level. In other words, at most stations the number of parked cars from a particular town using the station only in the "before" count was replaced by a similar number from the same town only in the "during" count. Therefore, town level data appear to form the most appropriate basis for analyzing the impacts of service and station improvements and the Southeast Expressway reconstruction.

6.3.4 Town-Level Analysis

Table 6.4 summarizes origins of autos observed at each station in the "before" and "during" surveys. The surveys were taken at the Stoughton, Canton, Mansfield and Sharon stations, each of which is located in the town of the same name; at Canton Junction Station in Canton, and at Route 128 station in Westwood. Of 1,914 "before" cars either having numbers matching Registry records or registered out-of-state, 836, or 44% were registered in one of the five towns with stations. This proportion increases to 49% if results from Route 128 station and the town

Town of Origin / Station	Stoughton		Canton Ctr		Mansfield		Sharon		Canton Jct		Rte. 128		Total		Change
	B	D	B	D	B	D	B	D	B	D	B	D	B	D	
STATION TOWNS															
Stoughton	60	79	5	15	1	2	13	10	120	106	21	12	220	224	+4
Canton	1	1	7	18	1	1	3	3	125	134	62	68	199	225	+26
Mansfield	-	-	-	-	107	105	2	4	2	1	4	4	115	114	-1
Sharon	1	2	-	1	-	-	192	209	25	22	9	14	227	247	+20
Westwood	-	-	-	-	1	1	1	1	2	-	71	69	75	71	-4
CONTIGUOUS TOWNS															
Easton	27	48	-	1	22	25	17	14	36	34	5	1	107	123	+16
Brockton	38	67	-	-	2	2	3	3	12	14	19	8	74	94	+20
Avon	2	3	-	-	-	-	-	1	-	-	2	-	4	4	-
Randolph	-	3	-	-	-	-	1	1	8	11	21	27	30	42	+12
Milton	-	1	-	-	1	-	1	2	-	1	6	8	8	12	+4
Dedham	-	1	-	1	-	-	2	-	2	1	49	45	53	48	-5
Norwood	-	-	-	1	4	2	3	2	35	29	31	23	73	57	-16
Walpole	-	-	-	-	1	1	18	15	10	7	16	14	45	37	-12
Foxboro	1	-	-	-	44	47	57	54	2	-	8	13	112	114	+2
Plainville	-	-	-	-	20	24	-	-	3	2	2	5	25	31	+6

B = Before D = During

DISTRIBUTION OF LICENSE PLATE ORIGINS
FOR COMMUTER RAIL STATION COUNTS
(UNADJUSTED DATA)

CTPS

TABLE 6.4 (p.1 of 2)

Town of Origin / Station	Stoughton		Canton Ctr		Mansfield		Sharon		Canton Jct		Rte. 128		Total		Change
	B	D	B	D	B	D	B	D	B	D	B	D	B	D	
N. Attleboro	-	-	-	-	31	35	2	1	-	-	-	-	33	36	+3
Attleboro	-	-	-	-	6	4	1	2	1	1	1	-	9	7	-2
Norton	1	-	-	-	52	53	-	1	2	-	1	1	56	55	-1
Boston	5	7	-	2	6	6	9	5	6	5	26	19	52	44	-8
MAJOR NON-CONTIGUOUS															
Taunton	1	-	-	-	13	12	-	1	-	-	2	1	16	14	-2
Needham	-	-	-	-	-	-	1	1	1	-	8	10	9	11	+2
Other Southeast	22	28	-	3	18	25	13	9	14	20	69	85	136	170	+34
Cape Cod	-	4	1	-	2	1	-	1	1	3	1	2	5	11	+6
Rhode Island	-	-	1	1	27	29	3	6	9	4	29	33	69	73	+4
Other States	2	2	-	1	8	9	4	8	7	5	18	12	39	37	-2
No Match 1 Observation	29	50	2	9	43	38	24	46	32	52	51	66	181	261	+80
No Match 2 Observations	24	29	2	6	30	30	36	37	42	33	20	19	154	154	-
"Illogical"	8	14	-	3	32	19	13	16	18	14	53	57	124	123	-1
Total	222	339	18	62	472	471	417	453	515	499	605	615	2,249	2,439	+190

B = Before D = During

DISTRIBUTION OF LICENSE PLATE ORIGINS
FOR COMMUTER RAIL STATION COUNTS
(UNADJUSTED DATA)

CTPS

TABLE 6.4 (p.2 of 2)

of Westwood are excluded. In the "during" count, of 2,024 cars from identifiable origins, 881 or again 44%, were registered in one of the five on-line towns.

After on-line towns, contiguous communities would be expected to contribute the greatest proportion of commuter rail riders. For the rail line segments in the study, contiguous communities are Boston, Easton, Brockton, Avon, Randolph, Milton, Dedham, Norwood, Walpole, Foxboro, Plainville, North Attleboro, Attleboro, and Norton. In the "before" counts, these communities accounted for 681 cars or 36% of those with identifiable origins. In the "during" counts they accounted for 704 or 35% of cars with identifiable origins.

The remaining 20% of "before" and 21% of "during" cars came from communities more than one town removed from the lines in the study. Of the "before" cars, 8% originated in various southeastern Massachusetts towns, 4% in Rhode Island, 2% in other states, and 6% from scattered points in Massachusetts. These percentages were the same for the "during" counts, except that 7% were from scattered Massachusetts' origins.

The results above indicate that the service improvements increased the ridership on the Attleboro and Stoughton commuter rail lines in about equal proportion from on-line, contiguous, and beyond contiguous town categories. There were differences in rates of change among the town in each category, however. Examining the results on a more detailed level, of the five on-line and 14 contiguous communities, 11 originated more parked cars in the "during" counts than in the "before" counts, one showed no change, and seven had fewer cars during than before. Of the seven with losses, five, Westwood, Dedham, Norwood, Walpole, and Boston which showed a combined loss of 45 cars, are served directly by stations on the Franklin Branch commuter rail line. That line also had service improvements, and showed a net ridership gain according to Boston & Maine Corporation conductors' counts. It is likely that many of the 45 cars were diverted to stations on the Franklin line. Vehicle losses for the other two towns were one each, which can be attributed to normal variation or to changes in access mode.

In absolute terms, the town with the greatest increase in parked car originations was Canton, at 26. This was to be expected, because of the doubling of service at Canton Center Station, but of the net increase, only 11 parked at Canton Center. There were net increases of nine Canton cars at Canton Junction and six at Route 128, neither of which had significant service changes.

Despite doubling of service to Stoughton Station, the town of Stoughton had a net increase of only four parked cars, consisting of increases of 19 at Stoughton Station, ten at Canton Center, and one at Mansfield, and losses of 26 at other stations.

The increase in total boardings at Stoughton Station was 215, or 98 more than the increase in total number of cars parked there. It is likely that many of the 98 new riders who did not drive were Stoughton residents. Some of them may previously have used other stations.

The greatest percentage increase in parked cars was 50% from Milton, but in absolute terms this was only a change from eight to 12 cars, distributed among several stations. Randolph was next, at 40% or 12 cars, of which six were at Route 128 and three each at Stoughton and Canton Junction.

The city of Brockton, which is next to Stoughton, and is one of the heaviest Boston work-trip generators in the area served by the observed lines, had a 27% increase in parked-car originations, at 20. This was the net result of increases of 29 at Stoughton and two at Canton Center, and a loss of 11 at Route 128.

The town of Sharon also had a net increase of 20 parked car originations, but this was a gain of only 9%. As might be expected, most of the increase was at Sharon Station.

The only other community to originate more than ten new parked cars was Easton, with 16, or a 15% increase. Easton is next to Stoughton. The net gain of 16 was made up of increases of 21 at Stoughton, three at Mansfield, one at Canton Center and losses of nine at other stations.

The absolute changes in parked cars by town are altered somewhat if no-match and illogical registrations are distributed in proportion to matched registrations. Table 6.5 summarizes the results of such a redistribution. Route 128 is treated as a special case, because of intercity Amtrak traffic. No-match plates are distributed in proportion to matched plates as at other stations, but illogical plates are assumed to belong to intercity passengers, and are simply deleted from the total.

Using the results in Table 6.5, the greatest individual gain is for Sharon at 41 cars, followed by Canton at 39, Brockton at 29 and Easton at 22. No other towns show gains of over 20. Randolph, at 16, and Stoughton at 15, are the only others with net gains over 10.

6.3.5 Results

- The license plate survey was based on a 100% sample of passenger vehicles parked at six commuter rail stations. For Massachusetts plates, the Registry file match rate was acceptable, at 84.4% for the "before" survey and 82.2% for the "during" survey. New registrations or data processing errors account for the balance.

Town of Origin / Station	Stoughton		Canton Ctr		Mansfield		Sharon		Canton Jct		Rte. 128		Total		Change
	B	D	B	D	B	D	B	D	B	D	B	D	B	D	
STATION TOWNS															
Stoughton	83	109	6	21	1	2	16	13	147	133	24	14	277	292	+15
Canton	1	1	9	26	1	1	4	4	154	168	72	81	240	279	+39
Mansfield	-	-	-	-	141	132	2	5	2	1	5	5	150	143	-7
Sharon	1	3	-	1	-	-	232	267	31	27	10	17	274	315	+41
Westwood	-	-	-	-	1	1	1	1	2	-	83	82	87	84	-3
CONTIGUOUS TOWNS															
Easton	37	66	-	1	29	32	21	18	45	42	6	1	138	160	+22
Brockton	53	92	-	-	3	2	4	4	15	18	22	9	97	125	+28
Avon	3	4	-	-	-	-	-	1	-	-	2	-	5	5	-
Randolph	-	4	-	-	-	-	1	1	10	14	24	32	35	51	+16
Milton	-	1	-	-	1	-	1	3	-	1	7	9	9	14	+5
Dedham	-	1	-	1	-	-	2	-	2	1	57	54	60	57	-3
Norwood	-	-	-	1	5	2	4	3	44	36	36	27	89	69	-20
Walpole	-	-	-	-	1	1	22	19	12	9	18	17	53	46	-7
Foxboro	1	-	-	-	58	59	69	69	2	-	9	15	139	143	+4
Plainville	-	-	-	-	27	30	-	-	4	3	2	6	33	39	+6

B = Before D = During

DISTRIBUTION OF LICENSE PLATE ORIGINS
FOR COMMUTER RAIL STATION COUNTS
ADJUSTED FOR NO MATCH AND ILLOGICAL ORIGINS

CTPS

TABLE 6.5 (p.1 of 2)

Town of Origin \ Station	Stoughton		Canton Ctr		Mansfield		Sharon		Canton Jct		Rte. 128		Total		Change
	B	D	B	D	B	D	B	D	B	D	B	D	B	D	
N. Attleboro	-	-	-	-	41	44	2	2	-	-	-	-	43	45	+2
Attleboro	-	-	-	-	8	5	1	3	1	1	1	-	11	9	-2
Norton	1	-	-	-	68	66	-	2	2	-	1	1	72	69	-3
Boston	7	10	-	3	8	7	11	6	7	6	30	22	63	54	-9
MAJOR NON-CONTIGUOUS															
Taunton	1	-	-	-	17	15	-	2	-	-	2	1	20	18	-2
Needham	-	-	-	-	-	-	1	2	1	-	9	12	11	14	+3
Other Southeast	30	39	-	4	23	32	16	12	17	25	80	101	166	213	+47
Cape Cod	-	6	1	-	3	1	-	2	1	4	1	2	6	15	+9
Rhode Island	-	-	1	1	27	29	3	6	9	4	29	33	69	73	+4
Other States	2	2	-	1	8	9	4	8	7	5	18	12	39	37	-2
Total	218	336	17	60	471	470	417	453	515	498	548	553	2,186	2,370	+183

B = Before D = During

DISTRIBUTION OF LICENSE PLATE ORIGINS
FOR COMMUTER RAIL STATION COUNTS
ADJUSTED FOR NO MATCH AND ILLOGICAL ORIGINS

CTPS

TABLE 6.5 (p.2 of 2)

- Over 40% of cars observed in "before" counts were not found in "during" counts, despite a net parking increase. Changes in access vehicles or access modes, rather than actual passenger turnover, appear to have been largely responsible.

- In both "before" and "during" counts, about 80% of the parked cars were registered either in the same town as one of the observation stations, or in a contiguous town.

- Excluding Route 128 Station, boarding counts found 1.6 passengers for every parked auto, but access modes and origins for non-auto drivers were not determined. Past survey results indicated that nearly all non auto-drivers live in on-line or contiguous towns.

- In 1975, 94% of all passengers using the same six stations observed by CTPS lived in on-line or contiguous towns. This proportion had fallen slightly, but still appears to be over 90%.

- Service improvements on the Stoughton and Attleboro lines increased ridership in about equal proportion from the on-line, contiguous, and beyond-contiguous town groups, but rates of change varied within groups. The overall number of parked cars increased 8.4% between the "before" and "during" counts.

- The greatest absolute increase in observed auto originations was 26, from Canton. The greatest percentage increase was 50% from Milton, but in absolute terms this was only four cars.

- License plate results significantly understate growth rates for towns such as Stoughton, where service improvements allowed passengers to shift from driving to a more distant station to walking to or being dropped off at a closer one.

- From a comparison of the stations where specific license plate numbers were observed in "before" and "during" counts, it was found that a plate observed before was most likely to be found at the same station during, or not to appear at any station in the "during" count.

- The largest single share of vehicles at each station originated in the town containing that station, and the next largest shares were from adjoining towns. Passengers did not always use the station nearest home, however, probably due to parking problems or differences in service frequencies.

6.4 COMMUTER RAIL RIDERSHIP SURVEY

Ridership increases reported by CTPS and the MBTA on Southside commuter rail lines during reconstruction raised interest in

the reasons for the success of the service. On Wednesday and Thursday evenings during the week of May 20, 1985 CTPS distributed a questionnaire to passengers on the Attleboro and Soughton branches of the Southside service. These two branches were selected because, as has been pointed out in preceding sections, reconstruction reportedly had its greatest ridership impact on these lines. Outbound, MBTA specified peak period trips were selected for the survey for two reasons:

- o The traffic management plan was geared to divert trips from the Expressway during the peak period when traffic flows were critically high; and
- o Distribution of survey forms was less labor intensive than would have been the case if inbound station coverage had been attempted.

6.4.1 Survey Procedure

Survey forms were distributed to passengers boarding Attleboro, Stoughton and Canton Junction trains between peak period hours of 4:00 and 6:00 PM by surveyors standing on boarding platforms. Passengers were asked to answer the questionnaire once on board and to return them to the surveyors canvassing the cars. Passengers unable to complete the questionnaire while riding were able to mail back the pre-stamped, CTPS addressed forms. The content of the questionnaire is shown in Figure 6-1.

Due to limitations on the availability of personnel all trains could not be surveyed on the same day. On Wednesday, May 22, 1985, the Attleboro, Canton Junction and two Stoughton trains were surveyed. The eight-car Stoughton train (No. 8969) was surveyed the next day, Thursday, May 23rd. The selected days, Wednesday and Thursday of a non-holiday week in the month of May was considered to be representative of the typical "universe" of Stoughton and Attleboro ridership.

In total, some 3,886 questionnaires were distributed, of which 67.8 percent or 2,634 were returned. Of these 2,588 were able to be keypunched for computer processing.

6.4.2 Results

Of the total respondents, some 326 riders indicated that reconstruction of the Southeast Expressway was one reason why they chose to use commuter rail. This group of riders represented approximately 12.6 percent of the survey respondents. Stated differently, among the peak period commuter rail users, 12.6 percent were influenced by the reconstruction project in reaching their decision to use or to continue to use commuter rail service.

This survey is being done to understand the effect of improved commuter rail service during the Southeast Expressway Reconstruction.

1. WHERE DO YOU LIVE? 10 [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]
(City or Town)

2. AT WHAT STATION DID YOU BOARD A TRAIN TO BOSTON TODAY? 23 [ ][ ][ ][ ][ ][ ][ ][ ][ ]

3. HOW DID YOU GET TO THAT STATION?
33-1 ( ) drove alone
-2 ( ) drove with passengers
-3 ( ) dropped off by another rail user
-4 ( ) dropped off by someone who drives away
-5 ( ) walk
-6 ( ) bicycle
-7 ( ) bus
-8 ( ) other

4. THE TRAIN YOU BOARDED AT THAT STATION WAS SCHEDULED TO DEPART AT WHAT TIME?
34 [ ][ ] hour [ ][ ] minutes 38-1 ( ) a.m. -2 ( ) p.m.

5. HOW OFTEN DO YOU USE COMMUTER RAIL SERVICE?
39-1 ( ) less than once/week
-2 ( ) one day/week
-3 ( ) two days/week
-4 ( ) three days/week
-5 ( ) four days/week
-6 ( ) five or more days/week

6. WHAT IS THE MAIN PURPOSE OF YOUR TRIP TODAY? CHECK ONE.
40-1 ( ) work
-2 ( ) school
-3 ( ) shopping
-4 ( ) social/recreational
-5 ( ) personal business
-6 ( ) other 41 [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

7. PRIOR TO EXPRESSWAY RECONSTRUCTION, HOW DID YOU MAKE THESE TRIPS?
51-1 ( ) drove alone .....
-2 ( ) drove with passengers..
-3 ( ) as an auto passenger...
-4 ( ) commuter rail
-5 ( ) other 53 [ ][ ][ ][ ][ ][ ][ ][ ][ ]

If by auto... CHECK ONE.
52-1 ( ) Expressway -2 ( ) another route

8. DID THE SOUTHEAST EXPRESSWAY RECONSTRUCTION AFFECT THE TIME YOU LEAVE YOUR DOOR TO MAKE THESE TRIPS?
TOWARD BOSTON: 62-1 ( ) Yes, I start 63 [ ][ ] minutes earlier.
-2 ( ) Yes, I start 65 [ ][ ] minutes later.
-3 ( ) No real change.

FROM BOSTON: 67-1 ( ) Yes, I start 68 [ ][ ] minutes earlier.
-2 ( ) Yes, I start 70 [ ][ ] minutes later.
-3 ( ) No real change.

9. WHAT ARE YOUR REASONS FOR USING COMMUTER RAIL SERVICE? CHECK ALL THAT APPLY.
72 ( ) time savings
73 ( ) cost savings
74 ( ) comfort, convenience
75 ( ) reliability
76 ( ) Expressway reconstruction
77 ( ) improved commuter rail schedule
78 ( ) new job, relocation, etc.

10. DO YOU PLAN TO CONTINUE TO USE COMMUTER RAIL SERVICE ONCE RECONSTRUCTION OF THE SOUTHEAST EXPRESSWAY IS COMPLETE? 79-1 ( ) yes -2 ( ) no

COMMENTS:_____

PLEASE RETURN THIS FORM TO THE SURVEYOR OR DROP IT IN A MAILBOX AT YOUR EARLIEST CONVENIENCE. THANK YOU FOR YOUR TIME.

173

COMMUTER RAIL
PASSENGER SURVEY FORM,
STOUGHTON & ATTLEBORO BRANCHES,
MAY 1985

CTPS
FIGURE
6-1

Within this segment of users, 172 or 52.8 percent switched to commuter rail once the reconstruction became imminent. Another 7.06 percent (23 in total) did not specify whether or by what means they had commuted before the reconstruction began. Combining the 172 mode-switch passengers with the 23 passengers not specifying a previous mode gives a 195 passenger subset of new commuter rail users influenced by the reconstruction.

Expressway commuters were also encouraged to use commuter rail because of the frequency improvements scheduled throughout the two years of reconstruction. An aggregation of users who indicated that either reconstruction or improved scheduling was a factor in their mode choice and, who actually switched modes to use commuter rail, revealed a total of 274 users, 10.6 percent of the survey sample. This segment constitutes the full range of users who were effected directly and indirectly by the Expressway reconstruction and traffic management plan.

Without considering the implications of seasonal and daily ridership fluctuations, it appears from these returns that this user segment constituted an 11.8 percent increase in ridership on the Stoughton and Attleboro lines during peak travel periods. (Absolute commuter rail ridership increase estimates resulting from the Expressway project are presented in Section 6.2.4.*)

In general, a number of similarities were found between the new user subsegment and the total survey sample. Response profiles are listed in Tables 6.6 and 6.7. As expected, the vast majority reported their trips were work related; 94 percent among the new users, 96 percent among all users. School trips were the second most often reported purpose; 3.3 percent among new users, 2.2 percent overall. Among new users, 51.5 percent use Attleboro trains, 7.6 percent use Canton Junction and 40.9 percent use the Stoughton trains. Attleboro branch users account for a similarly high 56.6 percent of the total among all users, with Canton Junction capturing 8.4 percent and the Stoughton branch carrying the remaining 35 percent. The difference between the percent new users versus all users on the Stoughton Branch indicates the relative strength of this line to attract commuters during the

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*On the basis of reports by surveyors, between 95 and 99 percent of the passengers accepted survey forms. Forms which could be read and computer keypunched represented 66.9 percent of the total distributed. An unadjusted range of total new expressway influenced commuter rail users can be calculated as follows:

95-99%	percent of users participating
66.9%	percent returns processible
274	new users influenced by scheduling or reconstruction
413-431	range of total new expressway influenced users

	Number	Percent
1. Users Responding:	2588	100
2. Purposes:		
Unspecified	13	-
Work	2477	96.2
School	56	2.2
Shopping	13	0.5
Social	13	0.5
Personal business	12	0.5
Other	4	0.2
3. Branch Usage:		
Attleboro	1467	56.7
Canton Junction	218	8.4
Stoughton	903	34.9
4. Origin Communities (Top 10):		
1. Sharon	292	11.3
2. Stoughton	289	11.2
3. Canton	289	11.2
4. Rhode Island (aggregate)	230	8.9
5. Boston	223	8.6
6. Mansfield	166	6.4
7. Attleboro	149	5.8
8. Easton	117	4.5
9. Foxboro	114	4.4
10. Brockton	96	3.7
5. Previous Mode:		
Unspecified	137	-
Drive Alone Auto	224	9.1
Drove with Passengers	44	1.8
Auto Passenger	39	1.6
Commuter Rail	2021	82.5
Other	123	5.0
6. Plans:		
Unspecified	92	-
Will Continue to use Comuter Rail	2470	99.0
Will Discontinue Commuter Rail Use When Reconstruction Terminates	26	1.0
7. Previous Route by Previous Mode:	Not Meaningful	
8. Change in Schedule:		
Changed in-bound departure time	112	5.3
Changed out-bound departure time	40	1.9
Changed both departure times	106	5.0
Did not change schedule	1861	87.8

ALL USERS RESPONDING TO "DURING" COMMUTER RAIL SURVEY

CTPS TABLE 6.6

	Number	Percent
1. Users Responding:	274	100
2. Purposes:		
Unspecified	2	-
Work	257	94.5
School	9	3.3
Shopping	2	.7
Social	2	.7
Personal business	2	.7
3. Branch Usage:		
Attleboro	141	51.5
Canton Junction	21	7.7
Stoughton	112	40.9
4. Origin Communities (Top 10):		
1. Stoughton	36	13.2
2. Rhode Island (aggregate)	34	12.5
3. Canton	30	11.0
4. Brockton	29	10.7
5. Easton	21	7.7
6. Foxboro	16	5.9
7. Sharon	13	4.8
8. Mansfield	13	4.8
9. Boston	10	3.7
10. Attleboro	8	2.9
5. Previous Mode:		
Unspecified	44	-
Drive Alone Auto	133	57.8
Drove with Passengers	30	13.0
Auto Passenger	17	7.4
Other	50	21.7
6. Plans:		
Unspecified	24	-
Will Continue to use Comuter Rail	243	97.2
Will Discontinue Commuter Rail Use When Reconstruction Terminates	7	2.8
7. Previous Mode and Route before Switching to Commuter Rail:		
Drove alone on Expressway	73	59.4
Carpooled on Expressway	24	19.5
Drove alone on Alternate Route	23	10.6
Carpooled on Another Route	9	7.3
Other	4	3.2
8. Change in Schedule:		
Changed in-bound departure time	50	24.3
Changed out-bound departure time	12	5.8
Changed both departure times	61	29.6
Did not change schedule	83	40.3

PROFILE OF USER GROUP REPORTING MODE SWITCH TO COMMUTER RAIL CITING RECONSTRUCTION OR IMPROVED RAIL SCHEDULE AMONG REASONS

CTPS

TABLE 6.7

reconstruction. This is most probably a result of the proximity of this branch to communities most directly affected by reconstruction.

A comparison of town of origin statistics for the top 10 towns also contains notable similarities:

Town of Origin	Rank	
	New User	All Users
Stoughton	1	2
Rhode Island (aggregate)	2	4
Canton	3	3
Brockton	4	10
Easton	5	8
Foxborough	6	9
Sharon	7	1
Mansfield	7	6
Boston	9	5
Attleboro	10	7

This comparison shows that the same 10 communities were the most frequently reported origins in each respondent segment. In general, the survey found that new commuters were attracted most heavily from those communities which already supplied the greatest volume of commuters to the system. For planning purposes this finding is significant in that, service improvements made in this case were most beneficial/attractive to those who already had a propensity, as noted in ridership statistics, to use the service. The degree to which users respond, however, depends upon the users perception of the threat posed to ordinary commuting patterns as well as the level of improvement made to the service in question. In the specific case of the Southeast Expressway reconstruction, the threat posed to users of the facility was great; the service improvement was 100%, (an effective doubling of peak period frequency), and the response was a 10 to 11 percent increase in ridership through the second year.

The improvements to commuter rail service were generally successful in reaching the intended target population: Expressway auto occupants. Among those who switched to the rail service, 58 percent previously drove alone. The service competed less effectively with other modes; capturing an additional 22 percent from non-auto modes such as rapid transit and private bus, and another 20 percent from carpools.

A total of 44 riders who indicated Expressway reconstruction/improved rail service as among their chief reasons for using commuter rail but who did not switch modes to use commuter rail, represent that population of new commuters who were making first-time, Expressway corridor commuting decisions. These 44 constitute 16.1 percent of the total new, reconstruction influenced riders, who may have as easily selected the Expressway as a means

of travel. Improved commuter rail service thus proved to be effective in competing for trips that otherwise could have contributed to nominal real growth increases in Expressway volume.

Of those who switched modes, 80.5 percent reported previous use of the Expressway facility for commuting purposes. The remaining 19.5 percent were off-Expressway commuters. Among the latter, only 1.6 percent previously travelled in non-auto modes. Of those attracted from the Expressway, 73.7 percent previously were drive alone travelers, 24.2 percent were in Expressway car pools and the remaining 2.1 percent suggested other modes. Again, commuter rail service happened to be a well targeted service in that the greatest proportion of affected users previously drove alone on the Expressway.

The problem of convincing commuters to change their mode of travel is often compounded by the need for motorists to change their schedule. Among those who switched to commuter rail service for the period of reconstruction, 89.3 percent reportedly made changes in their ordinary departure times to use the service. Of particular interest, among those who switched to commuter rail, fully 97 percent indicated that they would continue to use the service once reconstruction was complete.

6.4.3 Findings and Conclusions

- Commuter rail was able to attract more drive alone Expressway users than it did carpoolers and users of other modes.
- Peak period ridership grew between 10 and 11 percent, an absolute increase of between 370 and 420 round trip riders per day.
- Among the new user segment, nearly 90 percent changed commuting schedules in order to use commuter rail.
- Once users adjusted their schedule and switched to commuter rail, the service retained approximatley 95 percent of the new users. Clearly, the service reached the intended market (drive-alone Expressway users) and captured new permanent users.
- From a comparison of the stations where specific license plate numbers were observed in "before" and "during" counts, it was found that a plate observed before was most likely to be found at the same station during, or not to appear at any station in the "during" count.
- The largest single share of vehicles at each station originated in the town containing that station, and the next largest shares were from adjoining towns. Passengers did not always use the station nearest home, however, probably due to parking problems or differences in service frequencies.

7. Express Bus Service

CHAPTER 7: EXPRESS BUS SERVICE

7.1 INTRODUCTION

The South Shore is served by six private carriers which provide express bus service to and from downtown Boston. In hopes of attracting Southeast Expressway travellers currently using automobiles, additional service was provided through contracts with these carriers.

7.2 SERVICE STRATEGY

7.2.1 Additional Bus Service

Given that express bus service already existed in southeastern Massachusetts, the MDPW decided to subsidize some additional bus service during reconstruction. Most of the additional service was provided by the two existing carriers operating routes whose destinations were most heavily impacted by the reconstruction. A bus ridership monitoring program was established not only for those carriers offering subsidized service, but for all express bus carriers both before and during reconstruction periods.

The six carriers operating between downtown Boston and the South Shore on the Southeast Expressway are listed in Table 7.1. The Table also shows the carriers' Boston terminals and South Shore destinations. While the destinations served by private carriers did not change over the course of the monitoring periods, one carrier did change. In late 1984, after the start of the reconstruction project, Carey's Bus Lines began operating the South Shore routes formerly served by Hudson Bus Lines.

7.2.2 Cutbacks

A comparison of overall express bus ridership and bus departures for each of the monitoring periods is provided in Table 7.2. The Table shows that, despite a 14.6% increase in the number of bus departures from Boston to the South Shore between December 1983 (three months prior to the start of reconstruction) and April 1984 (one month after the project's beginning), ridership declined by 0.9 percent. It is difficult to assess whether the continued ridership decline of 3.5 percent between April 1984 and September 1985 or the overall ridership decline of 4.5 percent is the result of a shift to another mode. The variation could also be attributed to daily and seasonal fluctuations for which there are insufficient data to evaluate.

Carrier	Boston Terminal/ Pick-up Area	South Shore Destination
American Eagle Motor Coach, Inc.	Trailways Terminal	New Bedford
Baystate/Interstate Coach	Park Square; South Station	Bridgewater/Middleborough; Stoughton/Easton
Bloom Bus Lines	Trainways Terminal	Raynham/Taunton
Bonanza Bus Lines, Inc.	Greyhound Terminal	Fall River/Newport; Falmouth/Woods Hole; Pawtucket/Providence
Carey's Bus Lines (Serving destinations formerly served by Hudson Bus Lines.)	Park Square; South Station; Government Center; Financial District	Hingham; Hull; Rockland; South Weymouth; Whitman
Plymouth & Brockton Street Railway Co.	Greyhound Terminal; South Station	Hyannis; Duxbury via Pembroke and Hanover; Plymouth Ctr. via Kingston; Scituate via Cohasset and Hingham; Brockton; South Duxbury via Marshfield; Canton via Milton; Pembroke Ctr.

PRIVATE BUS CARRIERS OPERATING BETWEEN BOSTON AND THE SOUTH SHORE

CTPS

TABLE

7.1

Count Date	Ridership: Actual # of Passengers		No. of Trips: Actual Change	No. of Trips: Number	No. of Trips: Change
Tuesday Dec 13, 1983	3272			96	
Wednesday April 25, 1984	3241	from 12/83 to 4/84	-31 (-0.9%)	110	+14 (+14.6%)
Average of Tues, Sept 17, through Thur, Sept 19, 1985	3125	from 4/84 to 9/85	-116 (-3.5%)	88	-22 (-20.0%)
		from 12/83 to 9/85	-147 (-4.5%)		-8 (-8.3%)

PRIVATE CARRIER BOARDINGS OF BUSES DEPARTING BOSTON FOR SOUTH SHORE DESTINATIONS BEFORE AND DURING EXPRESSWAY RECONSTRUCTION PERIODS 3:30-6:15 PM

CTPS

TABLE 7.2

It is clear, however, that the additional service provided by the subsidy did not achieve a reduction in peak period traffic volumes during the first reconstruction period. The decision to continue funding additional service was based on the following criteria:

- o A minimum of 15 passengers served per trip.
- o A cost per passenger less than $3.60.
- o User access to alternate means of travel.

Accordingly, 23 subsidized departures were dropped after the first three months of the reconstruction period. The remaining bus departures were monitored every three months and those having at least 10 passengers were retained.

7.3 MONITORING PROCEDURES

7.3.1 Data Collection

PM peak period boarding counts were conducted at all downtown locations on December 13, 1983 before reconstruction, on April 25, 1984 after the project began and again from September 17th through the 19th in 1985. The information sought for each departing bus was (a) actual departing time, (b) vehicle number (c) seating capacity and (d) the number of boarding passengers.

The time periods for the boardings counts vary somewhat for each count as the summaries in appendix E show. However, in order to be consistent, all summaries and comparisons in the analysis include only those trips which departed from downtown Boston between 3:30 and 6:15 PM.

Some supplementary counts were conducted on different days to augment data for specific carriers. For instance, the time period of 6:00 to 6:15 PM was supplemented on December 20th for Hudson routes and February 7th and 8th for Plymouth and Brockton and Baystate/Interstate. In September, some Bonanza and Plymouth and Brockton trips were missed between 3:15 and 4:00 PM at the Greyhound Terminal. This trip monitoring was not repeated because the relatively low day-to-day variation for those carriers in that time period, as evidence by Tuesday's and Thursday's results, indicated that additional counts were not warranted.

7.3.2 Data Processing

The data collected on each of the count days was summarized by fifteen minute interval. Bus numbers were reviewed and compared for each location to ascertain those trips which made several downtown stops and those which collected passengers from one location only. In the summaries in appendix E, total

passengers and the total number of trips for each fifteen minute interval are recorded by destination and carrier. For buses stopping at more than one location, the totals of buses and passengers for all stops are recorded in the time interval of the last stop only.

7.4 ANALYSIS

As Table 7.2 shows, there was a slight decrease in absolute boardings from Boston to the South Shore between December 1983 and April 1984 and a somewhat more significant decrease between April 1984 and September 1985. Table 7.3 depicts the total number of boardings, the number of buses and the occupancy rate by carrier between 3:30 and 6:15 PM for each of the construction periods. Table 7.4 shows the percentage change in boardings and occupancy rates over the same periods and Table 7.5 shows the number of riders gained or lost by destination over each of the monitoring periods.

7.4.1 December 1983 - April 1984

From December, 1983 to April, 1984, the various carriers experienced rather different results with respect to passengers gained or lost (see Table 7.3). Three carriers gained riders (American Eagle, Baystate/Interstate, Bonanza) while the other three lost riders (Bloom, Hudson, Plymouth & Brockton).

This gain or loss in ridership can be compared to the increase or decrease in the number of trips made between December and April for each carrier. American Eagle had 9% more riders with the same number of trips; Baystate/Interstate had 6% more riders with one less trip; Bloom lost 13% of its riders with the same number of trips; Bonanza gained 13% in its ridership with one added trip; Hudson lost 16% of its riders despite the addition of six trips; and finally, Plymouth & Brockton lost 3% of its ridership while adding eight trips.

As Table 7.3 shows, this yields an overall loss of 0.9% of total ridership (31 persons), while a total of 14 trips were added between December and April. It should be noted that these were the actual numbers of buses counted, not necessarily all those scheduled by the private carriers, including those trips subsidized by the MDPW.

7.4.2 April 1984 - September 1985

Again ridership gains or losses varied for the different carriers between April, 1984 and September, 1985. American Eagle and Bonanza continued to gain riders. Bloom & Hudson also gained riders despite previous losses. Baystate/Interstate lost the rider they had previously gained and Plymouth and Brockton continued to lose riders.

Carrier	Dec. 1983-April 1984			April 1984-Sept. 1985			Aver Sept 17-19, 1985		
	Passengers	Trips[1]	Occup Rate[2]	Passengers	Trips	Occup Rate	Passengers	Trips	Occup Rate
American Eagle Motor Coach, Inc.	155	4	79.9	169	4	87.1	190	5	78.5
Baystate/Interstate Coach	202[3]	9	48.4	215	8	56.9	184	6	65.6
Bloom Bus Lines	174	4	88.8	152	4	77.6	201	5	82.3
Bonanza Bus Lines, Inc.	508	15	70.3	574	16	74.5	591	16	76.7
Carey Bus Lines/ Hudson Bus Lines[4]	256	8	63.1	214	14	35.5	263	9	62.2
Plymouth & Brockton Street Railway Company	1,977	56	74.5	1,917	64	63.0	1694	47	76.0
TOTAL	3,272	96	71.3	3,241	110	62.2	3124	88	74.5

[1] Most buses range between 41-53 seats; two Hudson buses in April 1985, however, were actually limousines with a seating capacity of about 11.
[2] Occupancy Rate = passengers per number of available seats, in percent.
[3] Includes a 3:20 PM trip (with 19 passengers), which was rescheduled for 4:00 PM (34 passengers) in the April Schedule.
[4] Carey began operating Hudson's South Shore routes late in 1984.

COMPARISON OF PRIVATE BUS CARRIER BOARDINGS FROM BOSTON TO THE SOUTH SHORE BEFORE AND DURING S.E. EXPRESSWAY RECONSTRUCTION PERIODS
ACTUAL OUTBOUND TRIPS, 3:30 - 6:15 PM

CTPS
TABLE 7.3

Carrier	Dec. 1983-April 1984			April 1984-Sept. 1985			Dec. 1983-Sept. 1985		
	Passen-gers	Trips	Occup Rate	Passen-gers	Trips	Occup Rate	Passen-gers	Trips	Occup Rate
American Eagle Motor Coach, Inc.	9.0%	±0	+9.0%	+12.4%	+1	-9.9%	+22.5%	+1	+1.4%
Baystate/Inter-state Coach	+6.4	-1	+17.6	-14.4	-2	+15.2	-8.9	-3	+35.5
Bloom Bus Lines	-12.6	±0	-12.6	+32.2	+1	6.1	+15.5	+1	-7.3
Bonanza Bus Lines, Inc.	+13.0	±0	+6.0	+3.0	+1	+3.0	+16.3	+1	+9.1
Carey Bus Lines/ Hudson Bus Lines[1]	-16.4	+6	-43.7	+22.9	-5	+75.2	+2.7	+1	+1.4
Plymouth & Brockton Street Railway Company	-3.0	+8	-15.4	-11.6	-17	-20.6	-14.3	-9	+2.0
TOTAL	-0.9%	+14	-12.8%	-3.5%	-22	+19.8%	-4.5%	-8	+4.5%

[1]Carey Bus began operating routes served by Hudson Bus Lines by the start of the second reconstruction period.

PERCENT CHANGES OF PRIVATE BUS CARRIER BOARDINGS FROM BOSTON TO THE SOUTH SHORE BEFORE AND DURING S.E. EXPRESSWAY RECONSTRUCTION PERIODS
ACUTAL OUTBOUND TRIPS, 3:30 - 6:15 PM

CTPS

TABLE 7.4

Destination	Carrier	Dec. 1983-April 1984	%	April 1984-Sept 1985	%	Dec. 1983-Sept 1985	%
Bridgewater/Middleboro	Baystate/Interstate	+13	+7.1%	-24	-11.5%	-11	-5.6
Brockton	Plymouth & Brockton	-10	-5.6	-41	-24.3	-51	-28.5
Canton	Plymouth & Brockton	0	±0	-14	-15.2	-14	-15.2
Duxbury	Plymouth & Brockton	-61	-13.4	-296*	-75.1	-357*	-78.5
Fall River/Newport	Bonanza	+7	+6.2	+17	+14.2	+24	+21.2
Falmouth/Woodshole	Bonanza	+9	+7.3	+28	+17.3	+32	+25.8
Hingham/Hull	Carey's/Hudson[1]	-15	+37.5	+14	+56.0	-1	-2.5
Hyannis	Plymouth & Brockton	+48	+12.9	-24	-6.0	+24	+6.4
Marshfield	Plymouth & Brockton	-7	-6.6	-6	-6.1	-13	-12.4
New Bedford	American Eagle	+14	+12.4	+21	+9.3	+35	22.5
Pawtucket/Providence	Bonanza	+50	+18.5	-23	-7.1	+27	+8.5
Pembroke	Plymouth & Brockton	+6	+21.4	+28*	+82.4*	+34*	+121.4*
Plymouth	Plymouth & Brockton	+12	+4.5	+248*	+88.3*	+260*	96.4
Scituate	Plymouth & Brockton	-48	-10.1	-116	-27.1	-164	-34.5
Taunton/Raynham	H & L Bloom	-22	-12.6	+49	+32.2	+27	+15.5
Weymouth/Whitman	Carey's/Hudson	+27	+16.6	+35	+18.5	+62	+38.3
TOTAL		-31	+9.0%	-116	-3.5%	-147	-4.5%

* Significant gains & losses on Duxbury, Pembroke and Plymouth trips are the result of the extension of Duxbury trips to Pembroke & Plymouth during the second reconstruction period.

[1] Careys began operating former Hudson routes by the start of the second reconstruction period.

EXPRESS BUS RIDERSHIP GAINS & LOSSES
BEFORE AND DURING RECONSTRUCTION PERIODS

CTPS
TABLE
7.5

Comparison of ridership gains and losses for this period with the increase or decrease in the number of trips made produces the following results. American Eagle increased its ridership by 12.4 percent with the addition of one trip; Baystate/Interstate lost 14.4 percent of its riders with a decrease of two trips; Bloom gained 32.2 percent more riders and added one more trip; Bonanza added one trip and gained 3 percent more riders; Carey's reduced the number of trips by five and gained 22.9% more riders and Plymouth and Brockton lost 11.6% of its riders while decreasing the number of trips by seventeen.

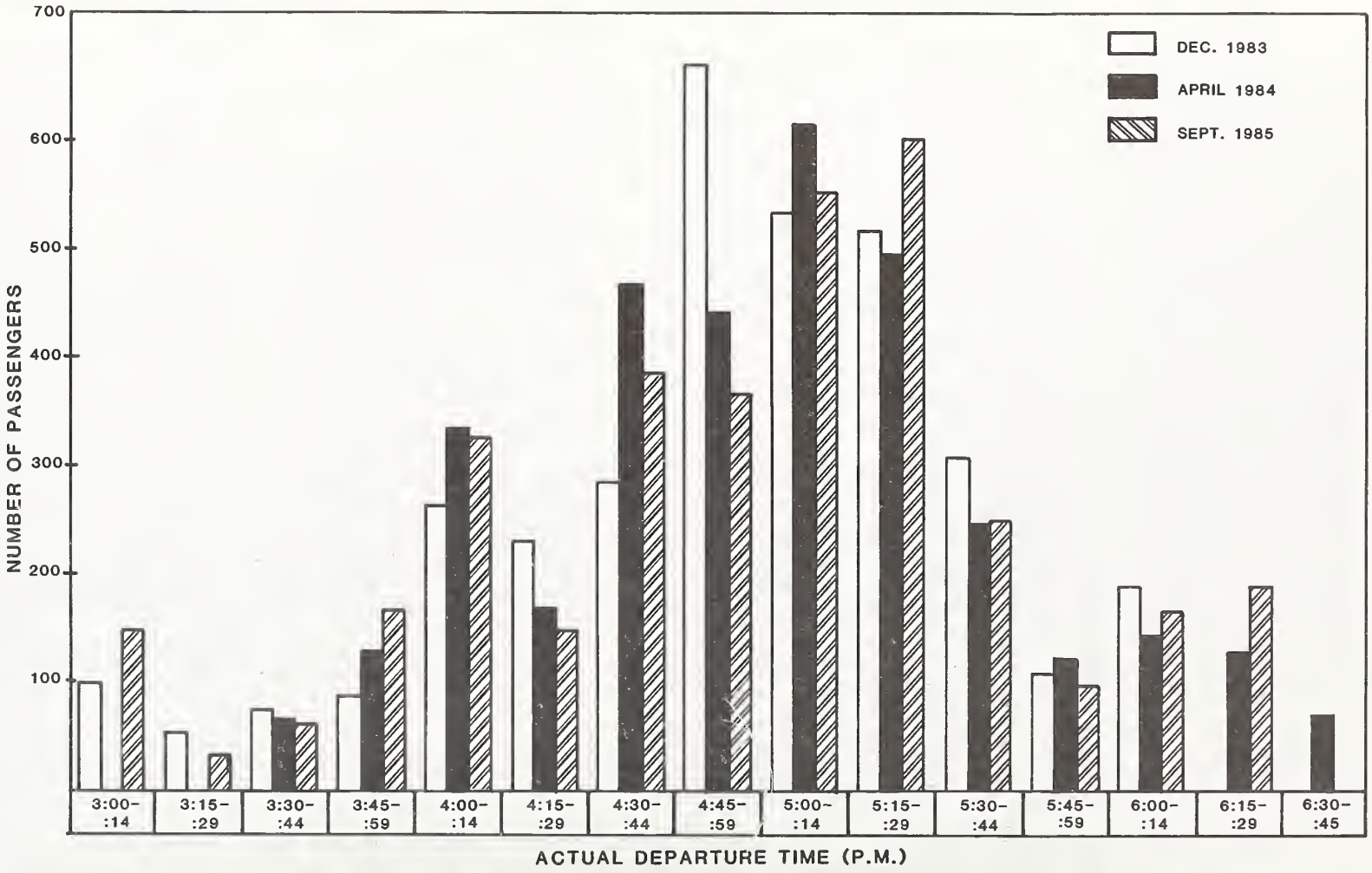
December 1983 - September 1985

Despite the erratic ridership gains and losses in relation to the changes in the number of trips among carriers, most carriers gained riders by September, 1985 in comparison with December, 1983. Plymouth & Brockton consistently lost riders over each period while Bonanza and American Eagle consistently gained riders. Plymouth and Brockton lost an overall of 14.3 percent, Bonanza gained 16.3 percent and American Eagle gained 22.5 percent. For Bloom and Carey's, the gain in riders from April, 1984 to September, 1985 more than offset the initial decline from December, 1983 to April, 1984. The overall percentage gains for these two carriers are 15.5 percent and 2.7 percent, respectively. The only other carrier besides Plymouth and Brockton that experienced an overall loss was Baystate/ Interstate. Despite its initial gain of 6.4 percent, its overall ridership declined by 8.9 percent.

Table 7.5 shows ridership gains and losses by destination as well as by carrier. It shows that with the exception of Hyannis, which actually experienced a slight gain, Plymouth & Brockton experienced losses on all of its routes. The apparent loss for Duxbury and gains for Pembroke and Plymouth are the result of extending trips that formerly went to Duxbury only during the first two periods. Because passengers were not asked their destinations when boarding, it is not possible to know for certain what the actual ridership was for Duxbury, Plymouth or Pembroke. Combining the totals for these destinations, however, indicates a net loss of a mere 3 passengers, (less than one half percent of the total).

The Plymouth & Brockton destination experiencing the most severe loss in ridership was Scituate which lost 164 or 34.5 percent of its riders. Carey's Weymouth/Whitman route experienced the most significant ridership gain. Its additional 62 riders represents an increase of 38.3 percent.

Figure 7.1 shows the total number of boarding by fifteen minute intervals for each survey period. The figure shows that for the most part, passenger boardings per interval remained relatively consistent and that the greatest number of boardings occurred between 4:30 and 5:30 PM, as one would expect.



COMPARISON OF BOARDINGS,
PRIVATE BUS CARRIERS FROM BOSTON TO THE SOUTH SHORE
OUTBOUND TRIPS 3:00-6:45 PM

CTPS

FIGURE 7-1

7.5 SUMMARY AND CONCLUSIONS

The key findings from the analysis of the counts taken before and during the Southeast Expressway reconstruction periods are:

1. Despite ridership gains on all but two carriers, overall ridership declined by 4.5 percent.

2. Carriers offering increased service during the first reconstruction period lost riders and service was cut back after the first three months of reconstruction.

3. Those same carriers experienced markedly different results with reduced service during the second reconstruction period.

4. While overall bus service was reduced by 8.3 percent between December 1983 and September 1985, by the second reconstruction period all carriers with increased riders were operating with an increase of one trip per carrier.

It is difficult to attribute the ridership gains and losses to any single cause since the results by carrier are so varied. Given the general decline in ridership, it is possible that improvements made on other high occupancy vehicle modes such as vanpools, commuter rail, and commuter boat attracted express bus users to them. It is also possible that, given the increase in riders in four out of six carriers, some people were drawn from their automobiles to express bus service. However, it is equally possible, as noted earlier, that the ridership gains and losses are the result of daily and/or seasonal fluctuation. The relatively brief duration of each of the survey periods did not generate sufficient data to evaluate this kind of variation.

It is important to bear in mind that, even though the additional service provided by the subsidy during the first reconstruction period was in-effective, the more modest subsidy of one bus for each of the carriers with increased ridership was well utilized. This would indicate that the concept can work if criteria are developed for its application. Additional service improvements such as upgrading the physical condition of the bus fleets, increasing the frequency of their service and providing high occupancy vehicle lanes for their travel could enhance the attractiveness of this mode.

8. Other Modes - Boat, Vanpool, Carpool

CHAPTER 8: OTHER MODES

8.1 COMMUTER BOAT

8.1.1 Introduction

A number of commuter boat services have operated between downtown Boston and the South Shore at various times over the past two decades. Ridership on these services has varied, depending on such factors as schedule frequency, operating speed, and docking locations. Generally, total daily ridership had not exceeded 100 to 200 passengers per direction and often had been lower.

Service had usually been provided by private operators on a limited schedule, consisting of one or two round trips per day, from either Hingham or Hull to one of several docks downtown. Travel times for these services had been in the range of 45 minutes to 1 hour, depending on whether the South Shore terminal site was in Hull or Hingham. Beginning in May, 1983, however, a private operator, Massachusetts Bay Commuter Services (MBCS) began providing more frequent, higher speed service between Hingham and Rowes Wharf in Boston.

The State sponsored a significant expansion of South Shore - Boston commuter boat service as part of the reconstruction mitigation program. Boston Harbor Commuter Services (BHCS) was engaged, under contract, to provide six subsidized trips per weekday between Hingham and Rowes Wharf, essentially doubling the amount of service between these two locations. A contract was also signed with MBCS at this time to provide it with a subsidy rate equivalent to that paid to BHCS. Public sponsorship of increased commuter boat service was intended in part as a relief measure during the reconstruction period, although it was anticipated that demand would justify continued operation of the service on a long-term basis.

Another new commuter boat service, operated by Harbour Crossing Company (HCC), was introduced at approximately the same time between North Quincy and downtown Boston. This service, which is financed solely from private sources, provided eight round trips per day. In addition, two longtime private operators continued to provide commuter service on a limited schedule, using conventional low-speed excursion boats. Bay State Spray and Provincetown Steamship Company operated one morning departure and one evening return trip between Point Pemberton in Hull and

downtown Boston. Massachusetts Bay Lines, Inc. operated on a similar schedule from Hingham. Key operating characteristics for all of the South Shore - Boston commuter boat service then in operation are presented in Table 8.1.

8.1.2 Changes in Ridership Levels

The effects of Southeast Expressway reconstruction on commuter boat ridership cannot be determined by simply comparing passenger count data for April, 1984 (one month following the start of construction) with similar data for April of the preceding year. The three principal commuter boat services (MBCS, BHCS, and HCC) which together accounted for approximately 75 percent of the South Shore commuter boat market, had not yet started their operations in April, 1983. A comparison of total ridership counts for April, 1983 and April, 1984 or 1985 would thus be highly misleading.

The First Construction Season

Ridership patterns for the three major commuter boat services are shown in Figure 8-1. These graphs correspond to the period beginning January 1, 1984. Ridership levels represent one way trips, in both directions. The only one of the three services in operation at the beginning of this period was MBCS. The graph shows MBCS ridership levels in the 400-450 range throughout January and February, with the exception of a single week in February when ridership reached a high of 642 passengers. This one-week peak does not appear to reflect a general trend of increasing patronage, but rather some unusual circumstance or event such as school vacation week. Ridership reached approximately 500 passengers during the two weeks preceding the start of construction on March 19. This increase over ridership levels recorded for most of January and February can be explained by one or both of the following factors:

- o Anticipation of Southeast Expressway reconstruction - Commuters may have been testing alternatives in expectation of construction-related traffic delays.

- o Seasonal variation - Commuter boat ridership is far greater during the warm weather months than in winter. It is possible that use of these services may begin to increase in late March as weather conditions improve.

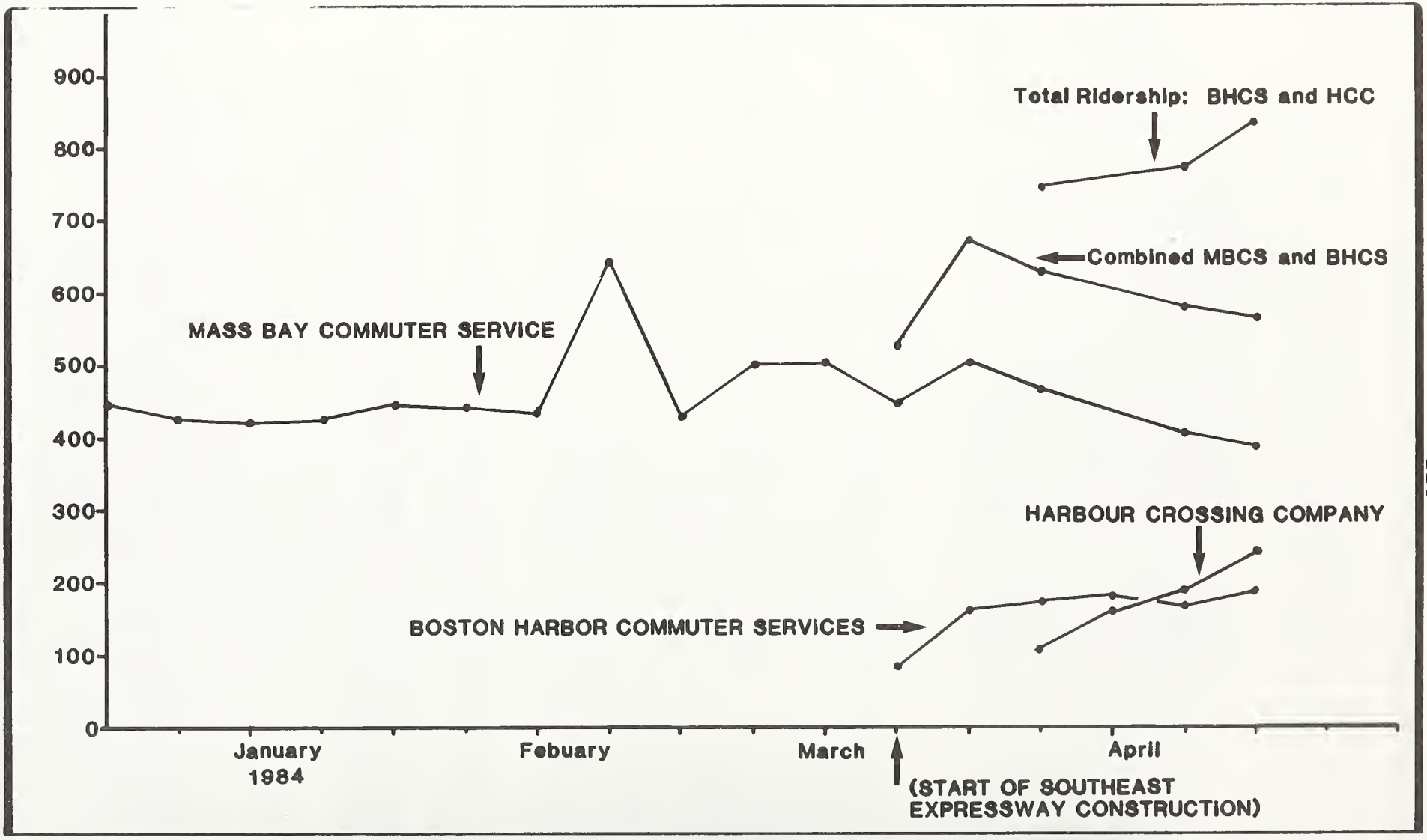
The new BHCS Hingham to Boston service was introduced concurrently with the beginning of Expressway construction on March 19, 1984. Total Hingham - Boston daily ridership rose to approximately 530 passengers during the first week of BHCS operations, although ridership on the MBCS boat declined to approximately 460 passengers. Combined ridership for both Hingham - Boston services peaked at 675 passengers during the second week following the start of Expressway construction. During this

Operator	Service Starting Date	South Shore Docking Location	Number of Round Trips Per Day	Travel
Massachusetts Bay Commuter Services	5/83	Hingham	7-8	30 min.
Boston Harbor Commuter Services	3/84	Hingham	6	35 min.
Harbour Crossing Company	4/84	Squantum	8	25 min.
Bay State Spray and Provincetown Steamship Company	11/75	Hull	1	45 min.
Mass Bay* Lines	1963	Hull	1	60 min.

*Mass Bay Lines initially operated the Hull to Boston service which is now operated by Bay State Spray & Provincetown Steamship Company

OPERATING CHARACTERISTICS OF SOUTH SHORE - BOSTON COMMUTER BOAT SERVICES

CTPS TABLE 8.1



	COMMUTER BOAT RIDERSHIP, 1984	CTPS FIGURE 8-1

week, MBCS ridership recovered to its earlier high level of 500 passengers per day, at the same time that BHCS ridership grew to approximately 160 passengers per day.

From March 30 to the end of April, total Hingham - Boston ridership gradually decreased from 675 to 580 daily passengers. This decline is notable since it occured during a period when seasonal factors might have been expected to produce some increase in ridership. It is also true, however, that combined ridership for the MBHS and BHCS operations at the end of April did exceed the maximum March ridership level for MBHS alone by 80 passengers. It is reasonable to conclude the following on the basis of the ridership pattern described above:

- Ridership does appear to have increased initially in response to anticipated construction-related traffic problems on the Southeast Expressway. The difference between peak ridership levels of 675 daily passengers, attained during the week of March 26 to 30, and ridership levels of 580 passengers recorded during the last week of April, can be attributed in part to commuter apprehension regarding expressway travel. It should also be noted, however, that the introduction of expanded commuter boat service surely accounts for some of the ridership increases evidenced in the weeks following the start of Expressway reconstruction.

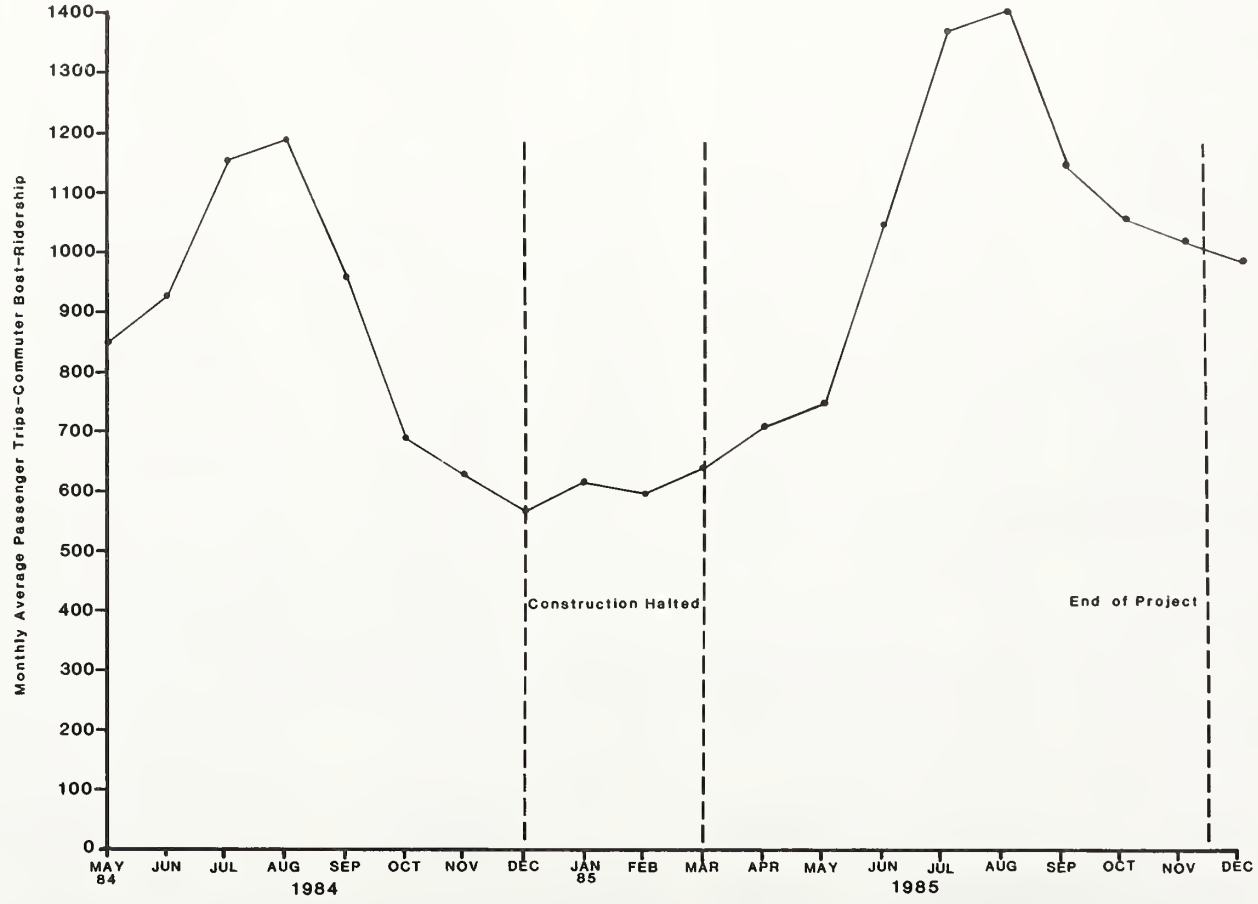
- Ridership increases related to Expressway reconstruction diminished during April as commuters became aware of favorable traffic conditions on the expressway.

Ridership on the HCC commuter boat service (Squantum to Boston) increased throughout the month of April, from an initial level of approximately 115 daily passengers to 240 passengers. There is no discernible relationship between ridership patterns for this service and construction-related expressway traffic conditions.

8.1.3 The Second Construction Season

During the second construction season, ridership on the commuter boat continued to grow. Figure 8-2 displays the ridership trends for the period from May, 1984, midway through the first construction period until December, 1985 at the end of the project. A few daily fluctuations were witnessed as a result of temporary service difficulties (i.e., equipment failure). However, overall trends were positive.

The seasonal fluctuations found in the first construction season were seen again in the second year but the differences between summer and winter were softened. Ridership was maintained throughout the fall at a far greater rate with a gain in ridership of 190 passengers in September, 360 in October, and 400 in November. As service levels remained consistently good, ridership increased for each time period.



MONTHLY AVERAGE COMMUTER BOAT RIDERSHIP
MAY 1984-DECEMBER 1985

CTPS

FIGURE

8-2

8.1.4 Conclusions

Commuter concerns about traffic conditions on the Southeast Expressway appear to have resulted in an initial, but temporary increase in Hingham - Boston commuter boat ridership. This early increase peaked during the second week following the start of reconstruction, when it reached a maximum probably no greater than 90 passengers (20 percent of pre-construction ridership). It appears that increases in commuter boat ridership related to Expressway construction may have started to materialize several weeks before the start of the actual construction period.

During the first construction year, ridership levels during the month of April exceeded those for February by 100 to 200 passengers. However, this may be attributed to two factors other than Expressway reconstruction:

- o significant expansion of commuter boat services
- o seasonal variation in ridership

These two factors alone can be considered to account for 100 percent of the ridership increase which occurred during the latter part of April, compared to February ridership levels. Only the additional ridership increase (totalling 90 or fewer passengers), that was evidenced temporarily in the late March -early April period immediately following the start of construction can be related directly to Expressway reconstruction. There is no evidence of significant Expressway-related ridership impacts on the HCC commuter boat service from Squantum to Boston, nor on the two longtime operators, Bay State Spray and Provincetown Steamship Company, and Mass Bay Lines, Inc.

Continued high quality service has, however, created dramatic long-term ridership increases. Furthermore, the Expressway project created an awareness of this alternative and has produced substantially improved headways and equipment throughout the initial subsidy. Both of these have directly caused higher ridership which has been maintained throughout the construction period.

8.2 RIDESHARING

8.2.1 Introduction

The public information effort and traffic management strategies were intended to lower traffic volumes on the Expressway and to encourage commuters who continued to travel on the facility to use high occupancy modes. Ridesharing was one strategy in the package of alternatives offered to commuters which would attain these goals. A marketing effort was coordinated by Caravan for Commuters, Inc., a private non-profit corporation funded by the Massachusetts Department of Public Works and the

U. S. Department of Transportation, Federal Highway Administration. Caravan's work program for the construction period emphasized the Southeast Corridor. A number of programs focussing on expanding ridesharing were initiated during this period. Concentrating heavily on widespread promotion of all existing commuter options, the focus was on taking vehicles off the road through all available modes, and encouraging drivers to seek alternate routes to work.

To promote ridesharing, a pre-existing carpool and vanpool matching program was expanded and a vigorous marketing campaign was conducted on the South Shore. Caravan also offered its organizational services to individuals, companies and institutions interested in beginning vanpool programs.

Furthermore, the privately owned South Shore vanpool fleet of over a dozen vehicles was included in the commuter hotline referral system, to help these drivers maintain their van ridership and to offer the public as many options as possible.

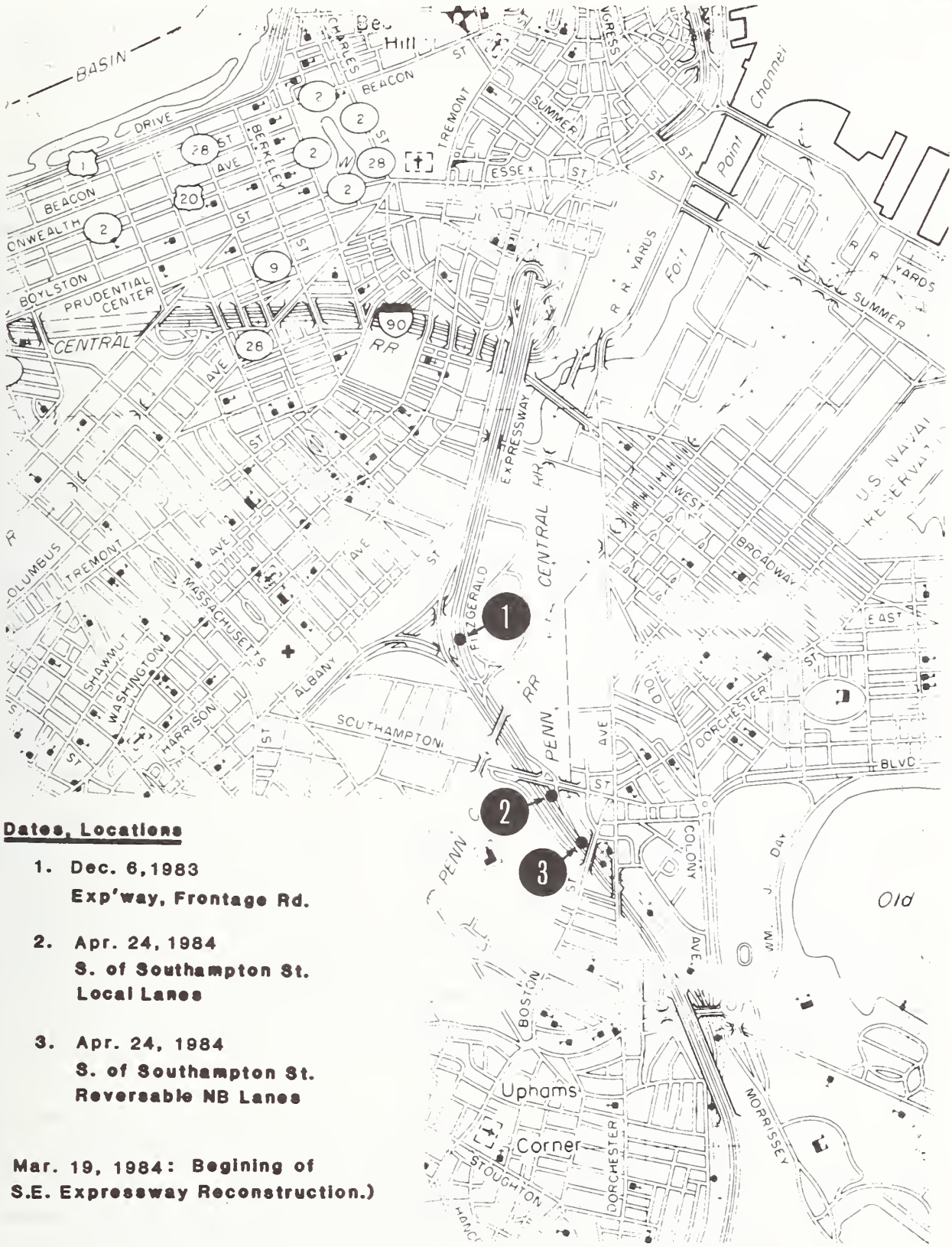
8.2.2 Carpooling

Automobile occupancy counts were taken before project work began and again during the reconstruction phase. Because the sample was limited to automobile occupancy, the success of the traffic management plan as measured by changes in overall vehicle occupancy cannot be determined. Automobile carpools were simply one of a number of high occupancy modes available to Expressway commuters. The service improvements made to all forms of transit operating within the corridor altered the competitive environment and may have reduced the potential for ridesharing.

Auto occupancy counts were taken on December 6, 1983, three months prior to the start of reconstruction and on April 24, 1984, one month into the project. The count station for the "before" count was located to the north of the Massachusetts Avenue exit in South Boston. For the second count, the station was moved approximately one-half mile south to a point immediately south of Southampton Street, within the project bounds. Survey stations are located in Figure 8-3. On both occasions, traffic was surveyed in the northbound direction only.

The initial count was taken between the hours of 7:00 AM and 2:00 PM and included three Expressway and three frontage road lanes. For the second count, occupancies were recorded between the hours of 6:00 AM and 6:00 PM on the four northbound lanes during the morning period and on the two northbound local lanes after the express lanes were reversed in the afternoon.

Recordings were made at 15-minute intervals for both counts. In the December count, data were obtained for only 30 minutes per hour, specifically between 7:15 - 7:30 and 7:30 - 7:45, then 8:15 - 8:30 and 8:30 - 8:45, and so on until 1:45 PM. In April,



Dates, Locations

1. Dec. 6, 1983
   Exp'way, Frontage Rd.

2. Apr. 24, 1984
   S. of Southampton St.
   Local Lanes

3. Apr. 24, 1984
   S. of Southampton St.
   Reverseable NB Lanes

Mar. 19, 1984: Begining of S.E. Expressway Reconstruction.)

AUTO OCCUPANCY SURVEY LOCATIONS ON THE SOUTHEAST EXPRESSWAY

CTPS

FIGURE 8-3

counts were done every 15 minutes from 6:00 AM to 6:00 PM. As many vehicles as possible were recorded during each time period.

8.2.3 Carpooling Results

A total of 8,271 vehicles were recorded for auto occupancy in December, representing a sample of about 25 percent. In April, 13,156 vehicles were recorded over the same period of time, (7:00 AM - 2:00 PM) a sample rate of 39 percent. The total 6:00 AM - 6:00 PM count in April recorded 20,976 vehicles, a 38 percent sample of all vehicles.

The key comparisons by time period of the two counts, and as related to a 1963 measure of auto occupancy of all-purpose trips in Boston, is shown in Table 8.2.

Table 8.2

Average Auto Occupancy for Three Counts, by Time Period

	Auto Occupancy Count		
Time Period	Dec. 6, 1983 (Before Recon.)	April 24, 1984 (During Recon.)	1963
7 AM - 9 AM	1.38	1.34	1.35
9 AM - 2 PM	1.31	1.33	1.34
Total: 7 AM - 2 PM	1.34	1.33	1.35
Total: 6 AM - 6 PM	NA	1.32	1.38

Table 8.2 shows that all auto occupancy averages for the time periods in question fall between 1.3 and 1.4.

The December - April comparison delineates the response of auto occupants to the reconstruction and the traffic management plan. The overall response ran counter to the anticipated user response, as average auto occupancy declined from 1.34 to 1.33. The tendency toward lower auto occupancy during reconstruction stemmed predominantly from the significant improvements which occurred during the peak period for motorists traveling in the peak direction.

In contrast to the 1963 time of day characteristics, average auto occupancy was relatively high during the morning peak period before the start of reconstruction when travel conditions were at their worst. Once reconstruction began, however, auto occupancy levels approached 1963 areawide averages for all periods between 7:00 AM and 2:00 PM. The effect of this trend was a decline in auto occupancy during the morning peak hour from a "before" average of 1.38 to a "during" average occupancy of 1.34. During the off-peak hours, 9:00 AM - 2:00 PM, average auto occupancy

advanced from the pre-reconstruction 1.31 to 1.33, approaching the 1963 areawide total for the same time of day. In combination, these movements resulted in a slight overall decline in auto occupancy for the 7:00 AM - 2:00 PM time period.

Improved mass transit services within the Expressway corridor most likely captured a portion of the carpool market. Commuter options which competed directly for part of the carpool market included commuter boat, vanpool, rapid transit and alternate routes.

8.2.4 Vanpooling

Overall, vanpool formation was not as prominent a travel option as was expected. An attempted injunction and subsequent lawsuit by private bus operators effectively curtailed a high-profile public promotion of the vanpool concept. In addition, in the second year of reconstruction, the suburban commuter market experienced unanticipated corporate slowdowns and shutdowns, including major layoffs throughout the high-tech industries that created uncertainty and a tentative market for employer-initiated programs such as ridesharing. Despite these negative influences, the rate of new vanpool group formation remained nearly constant. The market factors, however, exacerbated the expected difficulty of maintaining the stability of the existing van fleet. The larger a vanpool fleet, the more work required to keep the van ridership stable, and thus, existing fleets (such as Caravan's) demanded unprecedented marketing support. No data is available to document the change in vanpool formation which was initiated privately through individuals or companies. The only documented information is available through publicly-funded efforts.

Table 8.3 presents the trends in the number of Caravan vanpools and vanpool riders between the South Shore and Boston during 1979 - September 1984. As shown, slow growth occurred between 1979 and 1981. During 1982, the number of vanpools nearly tripled. Little growth in the numbers of vans and riders took place between January and November of 1983 (see Figures 8-4 and 8-5). This was in part due to the unavailability of vans. The increase in December of five vans reflects the delivery of the new vans, not a sudden increase in demand for vanpools. In addition, in July 1983 Caravan expanded its operations to include carpool matching services as information on all available transit options.

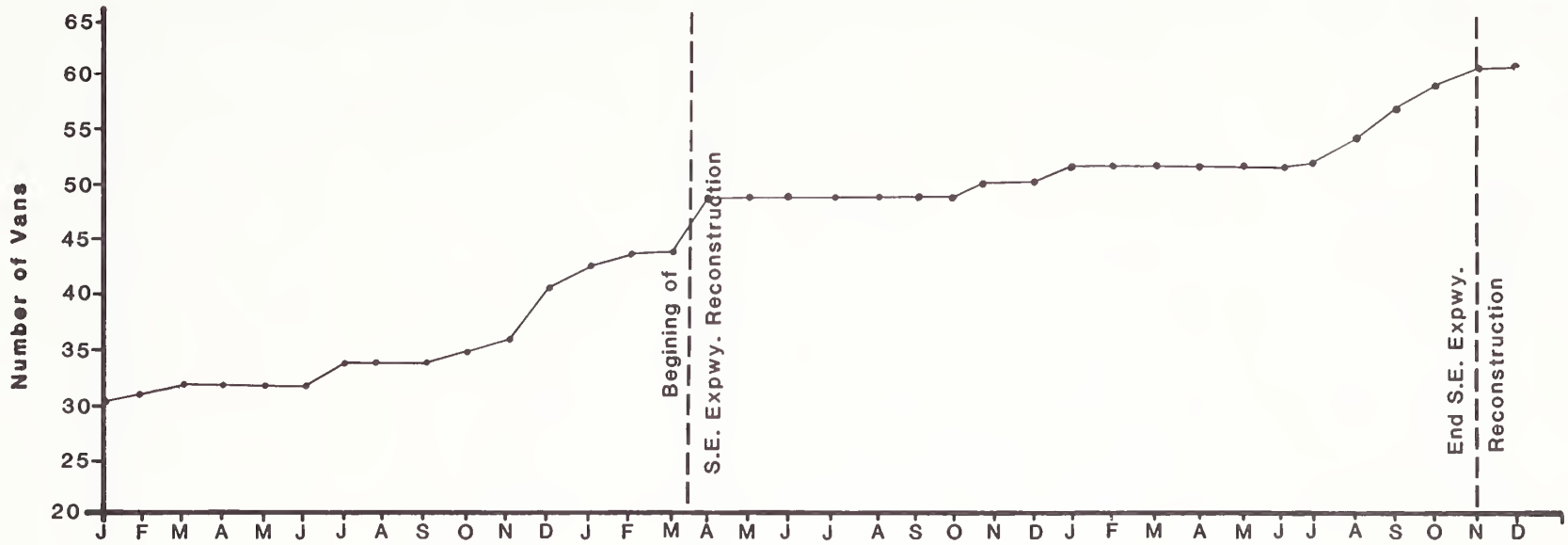
During the early part of 1984, the growth in vanpools was small but steady. An increase of five vanpools during April suggests that the reconstruction of the Southeast Expressway may have caused a sudden demand for alternative means of travel. Caravan staff, however, observed that no great surge of vanpool requests had occurred specifically due to the forthcoming reconstruction. Instead, it was suggested that the five additional vanpools during April probably included the supressed

	New Vans	Total Vans	Total Riders*
1979	2	2	28
1980	6	8	112
1981	3	11	154
1982	19	30	420
1983	11	41	574
1984	8	49	686
1985	12	61	854

*Based on 14 riders/van.

CARAVAN VANPOOL AND
RIDERSHIP TRENDS
BOSTON-SOUTHEASTERN MASSACHUSETTS
1979-September, 1985

CTPS
TABLE
8.3

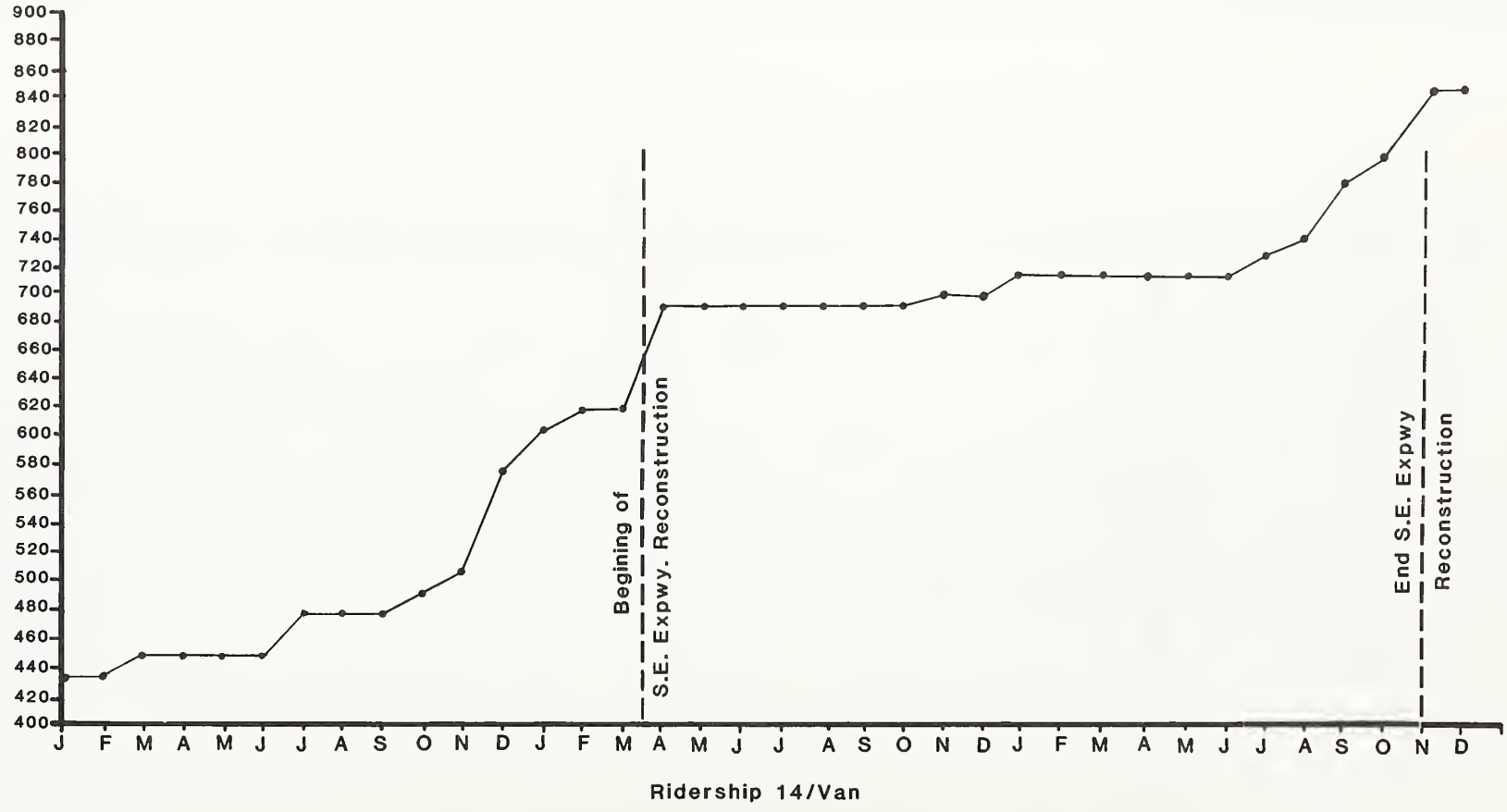


CARAVAN VANPOOL TRENDS, BOSTON-SOUTH SHORE,
JANUARY 1983-DECEMBER 1985

CTPS

FIGURE

8-4



CARAVAN VANPOOL RIDERSHIP TRENDS,
BOSTON-SOUTH SHORE, JANUARY 1983-DECEMBER, 1985

CTPS

FIGURE

8-5

demand during March when no vehicles were available. The second construction year showed a consistent increase with a total of 12 new vanpools established during the second construction period (October 1984 to November 1985).

Finally, the data do show growth in the number of vanpools and in vanpool ridership at normal levels since the beginning of reconstruction. However, the growth of riders has also been increasing throughout the region so that this change may not be caused by the reconstruction project alone.

8.2.5 Conclusion

Overall, automobile occupancy declined on the Expressway once reconstruction had begun. For comparable "before" and "during" periods, (7:00 AM - 2:00 PM), average auto occupancy declined slightly from 1.34 to 1.33. Auto occupancy actually declined most significantly (from 1.38 to 1.34) during the peak period for autos traveling in the peak direction. Off-peak occupancies moved slightly higher from 1.31 to 1.33 while peak period traffic in the off-peak direction carried below average occupant volumes.

Several reasons are suggested for the changes in occupancy attributable to the reconstruction. Primarily, pre-reconstruction occupancy of peak period traffic in the peak direction was much higher 1.38 than the 1963 area-wide average. The excessively high levels may have been symptomatic of a lack of alternative forms of mass transit services within the southeast corridor. The availability of new transit service during the peak period attracted its largest share of automobile users from carpools; suggesting a greater propensity among this group to use HOV modes.

The rise in mid-day occupancies to near 1963 area-wide levels suggests a shift of discretionary drive-alone trips to alternative forms of HOV travel including carpools. In this particular area, (off-peak travel), the traffic management plan appeared to have its greatest impact. This slight increase in occupancy levels, however, was not enough to offset the large peak period decreases which led to the slight decline experienced.

There was an increase in vanpools and in vanpool ridership, but the only portion for which data exists is the third-party vanpools formed by Caravan for Commuters, Inc. Caravan experienced an increase of eight vans during the first year of reconstruction and this netted approximately 112 new vanpool riders. The original travel mode of these riders is unknown. The second year of reconstruction netted 12 new vanpools and 168 new riders to bring the total number of vanpools from South Shore communities up to 61, representing 854 riders.

9. *Police Enforcement, Accident Response, Paddle Barriers*

CHAPTER 9: NON-TRAFFIC ELEMENTS OF ROADWAY SERVICE IMPROVEMENT

9.1 POLICE ENFORCEMENT

Officials from communities adjacent to the Expressway expressed great concern that diverted traffic would create serious congestion and safety problems in the neighborhoods through which alternate routes traveled. The MDPW, in cooperation with local police agencies, identified numerous intersections where police enforcement of traffic regulations and directing of traffic might be necessary. A multi-phased strategy was established to place police at 68 intersections during the first two weeks, at 31 intersections for the subsequent three weeks, and then at those intersections where clear problems existed. This special traffic detail was comprised of state and local police.

The enforcement effort on the alternate routes and on the project site was funded through the construction contract at a total cost of nearly $4.5 million. This amount surpassed all original estimates of the cost of this service, but many observers felt that this effort was critical to the success of the traffic management plan.

The direct benefit of the police crews is difficult to measure. However, it seems likely that the presence of the officers had several major benefits:

1. They kept traffic flowing at congested exits, especially on intersecting alternate routes.

2. They were available for rapid response to emergencies and incidents in the event that a tow vehicle was unavailable.

3. The police presence on the construction site definitely reduced the number of trucks in the left-hand lanes. To minimize congestion and to avoid a potentially dangerous accident situation, large trucks were banned from the reversible lanes. However, enforcing the regulation was a serious problem and the police presence helped to serve as a reminder.

9.2 ACCIDENTS AND EMERGENCY RESPONSE

Even under normal conditions, vehicle breakdowns can cause substantial traffic delays. During the reconstruction period,

the impact of breakdowns and accidents was much more serious. Much of the concern about traffic delays on the construction site stemmed from the limited access to the center lanes in the event of a vehicle breakdown or accident. This concern was heightened by several delays and vehicle breakdowns which had occurred in the weeks before the beginning of construction. The result was that high priority was placed on the provision of emergency vehicles. The MDPW required that the construction contractor provide four tow trucks to handle breakdowns and accidents.

During the entire construction period the towing services provided the following types of assistance:

Statistics for the period March 19, 1984 thru December 31, 1985	
Total number of vehicles serviced	12,383
Total number of vehicles towed or pushed from roadway	5,669
Total number of vehicles serviced for road repairs, (mechanical, water, flat, battery, oil, etc.)	5,054
Total number of vehicles serviced and/or moved off roadway because they ran out of gas	1,631

A surprising 13.2% of all vehicle servicing was performed on vehicles which simply had run out of gas along the roadway. Another 41% of the vehicles required road repairs and the remaining 47% needed assistance after accidents, driver illness, etc. Overall, however, there were fewer accidents during the construction periods than usual on the roadway. This was in part due to the reduction in weaving and simple lane changing from a more channelized roadway. It was also due to an increased police presence. Response time by police and tow trucks was about five minutes per call.

9.3 PADDLE BARRIERS

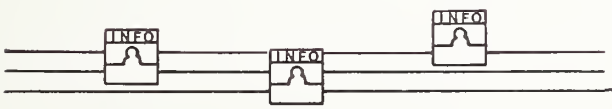
To separate the four, two-lane pairs along the 8.3 mile work section, 68,000 feet of temporary Jersey-barrier was used. The barrier was ordered four months prior to the start of actual work and stored in various locations along the project site until installation. The concrete barrier served to separate work areas from traffic lanes. The height of the barrier was not, however, sufficient to prevent motorists from viewing the construction activities.

Past experience in Massachusetts had shown that motorist curiousity seriously affected the movement of traffic. Because of this, paddle-type fiberglass screens were installed on top of the Jersey-barrier in bridge deck construction areas to prevent motorists from seeing the construction activity. The paddles were attached to a continuous plastic base which fit the top of

the barrier. Each set of paddles were fastened by means of a bolt set in the concrete surface.

Due to the spacing of the fifteen bridges on this project, and the fact that these bridge sections in combination extended for a total of 1.5 miles, the probability was high that absence of visual barriers would have caused speed and capacity reductions, offsetting the advantages of the reversible lane configuration. With visual screens at bridges, no reports were made by motorists, police, construction crews or media traffic reporters about construction site delays, thus providing some indication of their overall effectiveness.

10. Public Information



CHAPTER 10: PUBLIC INFORMATION

10.1 INTRODUCTION

The major objectives of the public information/community relations effort were the following:

(1 promote public awareness of what would happen during the reconstruction and why,

(2) establish realistic expectations of what construction conditions would be,

(3) encourage users of the Expressway to make appropriate preparations,

(4) prompt users to take advantage of the existing and improved transportation alternatives to the Southeast Expressway, and

(5) provide updates on daily conditions and delays. Funds were used to design and implement a coordinated media coverage program which included the production of public information materials, newsletters, a slide show, public service television shows, and a series of radio announcements.

10.2 STAFFING

In addition to the public information staffs of the Department of Public Works, the MBTA, the Central Transportation Planning Staff and Caravan, a special office within the MDPW was established to coordinate information dissemination on the reconstruction project. This office had a staff of three - a Community Coordinator, a Media Specialist and an Assistant. The staff members chosen were qualified professionals in the fields of public relations or community relations and two of the three were long-time residents (and activists) of the affected communities. They were hired as consultants, outside of the civil service system, and were responsible directly to the chairman of the planning task force. When necessary, these consultants had direct access to the MDPW Commissioner. This special status was seen as a distinct advantage since it emphasized to long-time MDPW employees the importance of the public information effort. This effort would otherwise have been difficult within the structure of a large state agency. In addition, this independent status permitted the Southeast Expressway Office to act as an

independent coordinating agency between agencies as opposed to an information staff responsible only to the Department of Public Works.

In addition to these staff resources, Caravan, the organization responsible for ridesharing, was used as an information brokerage agency throughout the project. This information clearinghouse function served to augment the work being done by all other agencies.

10.3 TARGETING THE AFFECTED PUBLIC

One of the more successful aspects of the public information/community relations effort was the comprehensiveness of the approach. There were two major "publics" likely to be affected by the reconstruction project. As is common with most highway projects, the "project-abutters" required extensive information on the up-coming construction and its likely effects. Neighborhood group meetings, civic associations and local special interest groups were all consulted.

Less common, however, were the massive efforts to identify the users of the Expressway and to prepare them for the construction. A full-scale public information program was developed for all communities which generated Expressway trips. A wider range of affected communities, reaching to the middle of Cape Cod and Interstate 495 (30+ miles from Boston), were also part of the program.

Much of this community effort focused on problems of local concern. For example, several local hospitals were concerned about ambulance response time and required some assurance that their patients could be served regardless of delays on the roadway.

10.4 MEDIA INVOLVEMENT

Public concern about the project's potential impacts created a great deal of media interest, especially in the few weeks before and after reconstruction began. All major news papers and radio stations provided valuable coverage including: (1) editorial pieces, (2) a special supplement on travel alternatives and project schedules, (3) daily traffic condition reports, and (4) feature news articles on the progress of the work. The media was supplied with information each morning at a news briefing held at the Southeast Expressway communications/field office which was conducted by the public information staff. This office also provided transit service information and updates. In addition, public service announcements were run by local television and radio stations as well as greater Boston area cable T.V. stations.

Clearly, all of this publicity was invaluable in notifying the public. The success of the project was, in part, due to the

fact that it was considered newsworthy and that consistent information was available through numerous sources.

10.5 COMMUNITY INVOLVEMENT TECHNIQUES

Community involvement techniques ranged from news coverage to public meetings. Table 10.1 summarizes these techniques, and describes their target public, objectives, and costs.

From March, 1983 until project completion, hundreds of public meetings were attended on the South Shore and throughout greater Boston. The Southeast Expressway Community Coordinator, the MDPW Director of Planning, the Commissioner of the MDPW and many MBTA and CTPS representatives held, attended, and spoke at over 300 meetings. These meetings were held with legislators, boards of selectmen, city councillors, public safety officials, local planning boards, regional planning agencies, chambers of commerce, Leagues of Women Voters, private businesses, neighborhood and community groups, hospitals, universities, and industry and service organizations (appendix F lists examples). These discussions with communities and their elected officials resulted in early identification of potential problems and in MDPW/MBTA planning to resolve them.

The community outreach effort enjoyed the cooperation and assistance of many government agencies and private associations as well. The Metropolitan Area Planning Council conducted regional meetings, disseminated information, prepared a slide show and newsletter, promoted subscription bus service on the South Shore and assisted in the improvement of private bus service in the region. The Old Colony Planning Council in Brockton and the Southeast Regional Planning and Economic Development District in Taunton appointed sub-area coordinators to set up area meetings to discuss the reconstruction and to participate in the community liaison effort by establishing an ongoing network of communications with the communities in each planning council area and in acting as regional contacts on the reconstruction project.

After the reconstruction began, the Expressway office continued the community outreach and public information program providing avenues for communication, public information, monitoring of the reconstruction and its impact, and assisting in ongoing adjustments.

As an aid to commuters, a personalized transportation hotline was staffed and promoted. Caravan's public hotline provided a clearinghouse of statewide commuter transportation information, offering the details on all forms of commuter alternatives. In addition to providing a free carpool/vanpool match list, the hotline offered statewide information on park-and-ride lots, vanpool routes, private bus schedules, the MBTA rapid transit system, public bus services, commuter rail, and commuter boats. Caravan

* Possible ** Useful *** Good **** Excellent	SPECIFIC PUBLIC			OBJECTIVES			COST
	Publicity and Information Distribution (uninformed public)	Public Meetings (motivated, highly informed public)	Advisory Groups (technically-able, motivated public)	Information TO the Public	Feedback FROM the Public	Management of Project Logistics	
Press Releases	**			**		**	Low
Public Service Messages	**			**		***	Low
News Coverage	***			***		***	Low
Feature Stories or Columns	***			***		*	None
Editorials or Letters to the Editor	*			*	*	**	None
Press Conferences	**			**		*	Low
Paid Advertisements	****			****		*	High
Television or Radio Appearances	**			**			Medium
Displays & Exhibits	***			****	*	*	Medium
Newspaper Inserts	****			****	*	*	High
Reports, Brochures & Info Bulletins	**	***	****	****		***	High
Videotapes & Slide Shows	*	**	***	****			High
Participatory Television	***			**	**		Low
Mailed Notices & Handbills	**	**		*			Medium
Public Hearings		*		*	****		Variable
Large Group/Small Group Meetings		****	**	***	****	*	Medium
Forums	***	**		***	*	**	High
Panel Discussions	**	***	**	***	**	*	Medium
Open Meetings		*	*	*	*		Low
Working Meetings			****	***	***	***	Low
Briefings	*	**	*	**			Low
Agency-Elicited Advisory Groups			****	***	***	****	Low
Interest-Group-Appointed Advisory Groups			***	***	***	*	Low
Neighborhood Advisory Groups			****	***	****	**	Variable
Field Offices	***	*		****	****	*	Variable
Technical Assistance to Public Groups			***	***	***	*	High
Hotlines	***			*	****		High
Surveys & Questionnaires	**				****		High
Interviews, Cumulative Brochures		**	**	****	*		High
Presentations or Speaking Engagements		**		**			Medium

COMMUNITY INVOLVEMENT TECHNIQUES:
SOUTHEAST EXPRESSWAY RECONSTRUCTION

CTPS

TABLE

10.1

also provided updated information on transportation projects and additional commuter services as they developed. Information was available about the Massachusetts Turnpike "Pool Pass," bicycle commuting, access to Logan Airport, and other commuter interests.

The public hotline handled over 4,000 incoming calls. At the start of the project, the number of calls was averaging about 75 per day. During the second year, the average dropped to 30 calls per day. Caravan staff made some direct referrals to public transit offices, in addition to the regular procedure of explaining transit schedules and routes to all interested callers.

To support this hotline, an extensive network of contacts with all public and private transportation providers was established. A system was set up to update periodically all information in the system. To complement the phone hotline service, Caravan's information brokerage program distributed materials directly to the commuting public.

New materials were prepared including:

-10,000 "Beat the Crush" maps which described the alternatives available to commuters.

-18,000 vanpool brochures

-15,000 carpool brochures

-5,800 MBTA materials (newsletters, 10% insurance discount pamph lets, flextime brochures)

-10,000 commuter rail materials (newsletters, schedules, pass booklets)

-2,000 commuter boat newsletters, shuttle information

-1,000 commuter boat schedules

-2,100 Massport/Logan Airport Ground Access booklets

-5,500 bus schedules

-5,200 "Boston by Bus" booklets

-1,800 subscription bus brochures

-500 bicycle commute brochures

-15,000 route posters for vanpool and carpool information

-6,000 general rideshare posters (each with 25 tearoffs)

-1,000 "Info Hotline" flyers

A "Commuter Information Station" was used as a means to distribute handouts directly to the individual commuter as well as to publicize the hotline service. These stations were set up in two dozen South Shore communities, as well as in all companies in the North Quincy industrial area and many Boston companies, building lobbies, and cafeterias.

Comprehensive information packets were sent to the town offices and public libraries of 38 South Shore communities. Nearly 60 communities were contacted and offered information on the project. Similar packets were also given to every legislator from the areas impacted by the project. To further extend community outreach, the staff participated in several public meetings in local communities, and other related projects like the South Shore Plaza Commuter Fair.

Caravan alone distributed over 100,000 printed pieces of information about the project and available commuter alternatives. Between mid-January and the first of April 1984, Caravan staff handled over 4,000 hotline calls, matching over 1,000 carpools in their period (with nearly 80 percent match rate at this time because of the concentration of calls from proximate communities). More than 350 referrals were made directly for the MBTA, private bus, commuter boat, and rail services.

10.6 CONCLUSIONS

The public information effort was considered a critical component of the overall traffic mitigation program implemented by the MDPW. As will be discussed in Chapter 12, close to 95 percent of Expressway users surveyed by the state had received some form of information on the project. The fact that there was a substantial reduction in the number of cars during the initial days of the reconstruction project attests to the effectiveness of the public information campaign.

11. Aid to Affected Communities

CHAPTER 11: AID TO AFFECTED COMMUNITIES

11.1 INTRODUCTION

Even with the large number of mitigation measures proposed in the corridor management plan a number of communities continued to express concern over the adverse local impact of the reconstruction work. Fears were voiced as to the possible build-up of traffic on main thoroughfares and residential streets with insufficient capacity to handle the additional burden of vehicles diverted from the Expressway. This was viewed as unfairly penalizing residents already subject to excessive congestion delay as part of the daily work commute.

11.2 LOCAL AID PROGRAM

In response to these concerns, the MDPW set aside $500,000 of the $2.0 million appropriated by the legislature to be used by municipalities to establish a community-based traffic management program during reconstruction. Figure 11-1 is a sample of the letter sent to municipal officials seeking proposals for this program. As noted in the letter, the intent was to address problems clearly related to the reconstruction project through actions which could be implemented before the start of work, and that could be easily administered. Priority would be given to proposals which created local carpool programs, provided buses for express bus service, subsidized residents to encourage the use of public transit, created informational programs, and/or provided temporary personnel to enhance traffic movement.

Community support for this program was widespread. Approximately twenty (20) proposals were submitted, the majority of which were for individual, community-based programs. However, others were received from communities which proposed joint efforts among themselves and neighboring communities. Most of those funded specified the local agencies such as a Council on Aging, Police or Fire Department responsible for providing the service for which funding was required.

Of the amount appropriated ($500,000), some $322,000 was authorized for the municipalities. Of this, actual expenditures through the second year of reconstruction totalled $202,000. The less-than-approved expenditure was the result of experience from the first reconstruction season which showed that certain projects were unnecessary.

The Commonwealth of Massachusetts
Executive Office of Transportation and Construction
Department of Public Works
Office of the Commissioner
100 Nashua Street, Boston 02114

January 11, 1984

The Honorable Raymond Flynn
Mayor
City of Boston
City Hall
Boston, Massachusetts 02201

Dear Mayor Flynn:

The State Legislature has provided funds to the Executive Office of Transportation and Construction for implementing actions that will minimize the disruption and impact of the Southeast Expressway reconstruction project. Some of these funds will be used to support community-based projects which are designed to help cities and towns implement their own mitigating actions. I invite you to submit proposals to the Department of Public Works for actions that will lessen the impact of the Expressway reconstruction on your community and/or on your citizen commuters.

The types of actions that will receive serious consideration include local carpooling efforts, buses leased by the community for express commuting services, subsidies to resident commuters to encourage use of mass transit, information dissemination strategies, additional crossing guards, and police for traffic management. Because available funds are limited, priority will be given to those actions which are, 1) clearly related to inconvenience caused by the reconstruction project, 2) able to be implemented by March 15, 1984, and 3) easily administered.

The attached brochure provides you with important information regarding the Expressway reconstruction. If you would like additional brochures, please let me know.

Because we will be beginning the reconstruction project in mid-March, I would like to receive your proposals by February 3, 1984.

Sincerely,

ROBERT T. TIERNEY
COMMISSIONER

EXAMPLE LETTER REQUESTING PROPOSALS FOR COMMUNITY-BASED TRAFFIC MANAGEMENT PROGRAMS

CTPS
FIGURE 11-1

Actions initially funded included commuter bus service, carpool/vanpool matching services, additional police and fire personnel, commuter information projects, additional emergency vehicle services, and expansion of commuter parking facilities.

12. Survey of User Travel Patterns

CHAPTER 12: USER SURVEY AND TRAVEL PATTERN CHANGES

12.1 INTRODUCTION

In order to identify changes in travel behavior, the state conducted a survey of Expressway users. The survey was designed to determine which modes of transportation were tried during the initial phase of the project and which were used on a continuous basis. Hypothesized changes in auto occupancy rates, start time of travel, and total trip times that were occurring in conjunction with the disruption of the Expressway were also examined. In addition, information was included on trip purpose, origins and destinations, auto availability, and the impact of the reconstruction on weekend travel.

12.2 SURVEY PROCEDURES

The user survey was conducted between late April and mid-June of 1984. Consisting of a two-page, postage-paid form, the survey was distributed by mail to addresses matching the original registration site of vehicles inventoried on the Expressway. Respondents were requested to complete the survey and return it by mail. Nearly 600 useful completed surveys were obtained.

The questionnaire was designed as a mail-back, self-administered survey of people who had been using the Southeast Expressway prior to the beginning of its reconstruction. This sample was selected in two ways:

1. Approximately 9,660 license plate numbers were recorded as Expressway users in early December 1983. These licenses were then matched against current registry records to produce a total of 7,937 matching addresses.

2. In addition, approximately 2,000 license plates' address matches were taken from the 1977 Central Artery survey.

The surveys were distributed in two separate mailings on April 27, 1984 and again on June 12, 1984. Of these, 595 usable surveys were completed and returned to CTPS for processing and analysis. A copy of the questionnaire is shown in Figure 12-1.

12.3 ANALYSIS OF SURVEY RESULTS

This section presents the results of the survey on a question-by-question basis and concludes with a discussion of

The Mass. Dept of Public Works began reconstruction of the Southeast Expressway (between Mass Avenue and Route 128) on March 19th. This survey is being conducted to better understand the effects of reconstruction of the Expressway on travel patterns and to provide better transportation service during reconstruction.

If you were traveling REGULARLY (AT LEAST ONE DAY PER WEEK) on the Expressway before reconstruction, please answer the following questions.

The following questions (A through L) apply ONLY to the trip you made MOST OFTEN on the Expressway.

PRIOR TO TWO WEEKS BEFORE RECONSTRUCTION (before February 29th)

A. HOW OFTEN DID YOU USE THE EXPRESSWAY BEFORE FEBRUARY 29TH?

	days/week	round-trips/day
As a driver without passengers:	10 [ ]	13 [ ]
As a driver with passengers:	11 [ ]	14 [ ]
As a passenger:	12 [ ]	15 [ ]

B. HOW MANY PEOPLE WERE USUALLY IN THE VEHICLE?

16 [ ] including yourself

C. WHAT WAS THE MAIN PURPOSE OF THE TRIP?

17-1 ( ) home to work
-2 ( ) home to school
-3 ( ) home to shopping
-4 ( ) home to social/recreation
-5 ( ) home to personal business
-6 ( ) home to other
-7 ( ) nonhome to nonhome (such as work to shop)

D. WHERE WAS THE DESTINATION OF THE TRIP? PRINT NAME OF CITY/TOWN OR SPECIFIC PART OF BOSTON (NEIGHBORHOOD).

18 [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

E. WHAT TIME DID YOU USUALLY BEGIN YOUR TRIP?

30 [ ][ ] (hr) : [ ][ ] (min)
34-1 ( ) a.m.
-2 ( ) p.m.

F. HOW LONG DID IT TAKE YOU TO MAKE THE TRIP? GIVE AVERAGE DOOR-TO-DOOR TRAVEL TIME.

35 [ ][ ] minutes on the average

TWO WEEKS BEFORE AND AFTER BEGINNING OF RECONSTRUCTION (during March)

G. WHAT MEANS OF TRAVEL DID YOU TRY AND HOW OFTEN? CHECK AS MANY AS APPLY.

	how often (days)
37 ( ) I did not change.	
38 ( ) rapid transit	48 [ ]
39 ( ) commuter rail	49 [ ]
40 ( ) express bus	50 [ ]
41 ( ) commuter boat	51 [ ]
42 ( ) vanpool	52 [ ]
43 ( ) driver on Expressway	53 [ ]
44 ( ) passenger on Expressway	54 [ ]
45 ( ) driver on alternate route	55 [ ]
46 ( ) passenger on alternate route	56 [ ]
47 ( ) other	57 [ ]

H. HOW DID YOU OBTAIN INFORMATION ON OTHER MEANS OF TRAVEL? CHECK AS MANY AS APPLY.

58 ( ) I have not heard of other means of travel.
59 ( ) radio/TV
60 ( ) newspaper
61 ( ) community meetings
62 ( ) word of mouth
63 ( ) poster
64 ( ) pamphlet
65 ( ) telephone information
66 ( ) other

DURING RECONSTRUCTION (Since April 1st)

I. WHAT MEANS OF TRAVEL ARE YOU USING NOW? CHECK NO MORE THAN THREE.

67 ( ) rapid transit
68 ( ) commuter rail
69 ( ) express bus
70 ( ) commuter boat
71 ( ) vanpool
72 ( ) driver on Expressway
73 ( ) passenger on Expressway
74 ( ) driver on alternate route
75 ( ) passenger on alternate route
76 ( ) other

77 ( ) changed destination
78 ( ) gave up trips
→ If checked, go to Question M.

J. PLEASE GIVE INFORMATION ON THE MEANS OF TRAVEL YOU ARE NOW USING AND CHECKED IN QUESTION I ABOVE. FOR THE QUESTION OF "HOW DO YOU TRAVEL?" BELOW, PLEASE USE NUMBER CODE FROM QUESTION I ABOVE.

	how do you travel? (code)	how often? (days/wk)	how often? (round trips/day)	when does the trip begin? (hr)	(min)	(a.m. or p.m.)	how long does trip take? (min)
10	[ ][ ]	[ ]	[ ]	[ ][ ] :	[ ][ ]	18-1 ( ) a.m. -2 ( ) p.m.	19 [ ][ ]
21	[ ][ ]	[ ]	[ ]	[ ][ ] :	[ ][ ]	29-1 ( ) a.m. -2 ( ) p.m.	30 [ ][ ]
32	[ ][ ]	[ ]	[ ]	[ ][ ] :	[ ][ ]	40-1 ( ) a.m. -2 ( ) p.m.	41 [ ][ ]

K. IF YOU ARE TRAVELING BY CAR, HOW MANY PEOPLE ARE IN THE CAR?

43 [ ] including yourself

L. IF YOU CURRENTLY USE MEANS OF TRAVEL OTHER THAN A CAR, IS A CAR AVAILABLE FOR THE TRIP ON THE EXPRESSWAY (AND YOU DECIDED NOT TO USE IT)?

44-1 ( ) yes -2 ( ) no

M. HAS THE RECONSTRUCTION AFFECTED YOUR WEEKEND TRAVEL?

45-1 ( ) yes --> If yes, in what way? _____
2 ( ) no

N. PLEASE WRITE ANY COMMENTS YOU MAY HAVE ON RECONSTRUCTION OF THE EXPRESSWAY.

_____
_____
_____
_____

Thank you very much. Now, please fold the card so that the return address is facing outward, apply the enclosed sticker, and drop the card in any mail box.

THE SOUTHEAST EXPRESSWAY USERS SURVEY

CTPS

FIGURE 12-1

inter-relationships among variables. Questions A through F pertain to pre-construction conditions; questions G and H to the transition period, and questions I through N reflect "during" patterns.

Question A:

How often did you use the Expressway before reconstruction?

This information is summarized in Table 12.1. As might be expected, the majority of respondents used the Expressway five days a week, made one round-trip per day, and drove alone.

Question B:

How many people were usually in the vehicle?

The distribution of responses is as follows:

1	73%
2	18%
3	4%
4	2%
5 or more	3%

Question C:

What was the main purpose of the trip?

The predominant Expressway trip was home-to-work trips (84%), with all other trip purposes claiming a small percentage of the total number of trips. The distribution of all trip purposes was:

Home to work	83.9%
Home to school	2.6
Home to shopping	1.9
Home to social/recreation	2.3
Home to personal business	3.4
Home to other	2.4
Non-home to non-home (such as work to shop)	3.5

Question D

Where was the destination of the trip?

Boston - Downtown:	52.2%
Dorchester/Roxbury	7.8
East Boston	5.0
South Boston	4.1
Allston/Brighton	2.2
All Boston (subtotal)	71.3%

Days per Week	Driver Alone	Driver With Pass	Passenger
1	45	43	11
2	41	26	12
3	30	13	7
4	26	10	11
5	237	61	18
6	29	5	0
7	4	1	0

Round Trips per Day	Driver Alone	Driver With Pass	Passenger
1	392	148	57
2	6	2	0
3	1	2	0
4	3	0	2
5	1	0	0
6	1	1	0
7	0	0	0

DAYS/WEEK AND ROUND TRIPS/DAY FOR EXPRESSWAY USERS, "BEFORE"

CTPS TABLE 12.1

Cambridge, Somerville & Medford	1.7%
South Shore Communities	6.8%
North Shore Communities	9.9%
	100.0%

Question E

What time did you usually begin your trip?

The starting time for respondents using the Expressway was distributed as follows:

Time Period	Start Time
5 AM to 6 AM	8.2%
6 AM to 7 AM	30.4%
7 AM to 8 AM	28.2%
8 AM to 9 AM	12.6%
9 AM to Noon	7.8%
Noon to 2 PM	4.2%
2 PM to 4 PM	2.0%
4 PM to 10 PM	3.3%
10 PM to 5 AM	2.2%

Although the start of trip times was not directly comparable with peak volumes on the Expressway, the early start time of trips reflected the high number of work trips. Even with this, the time periods claimed as the start time are earlier than expected.

Question F

How long did it take you to make the trip?

Travel times were distributed in the following way:

0 - 15 minutes	2.4%
16 - 30 minutes	18.8%
31 - 45 minutes	31.6%
46 - 60 minutes	29.0%
61 - 75 minutes	11.9%
76 - 90 minutes	5.2%
91 - over	.9%

Over 50% of all respondents report travel times of 45 minutes or less.

Transition Period

Question G:

During the two weeks before and after the beginning of reconstruction, what means of travel did you try and how often?

Mode of Travel	% of Respondents	How Often (days) 1	2	3	4	5	6	% of Days
Rapid transit	8.9	9	6	6	5	16	1	24.0
Commuter rail	3.2	4	1	2	4	6	1	10.6
Express bus	3.7	1	4	2	5	5	0	9.9
Commuter boat	2.5	2	2	1	3	6	0	0.2
Vanpool	.3	1	0	0	0	0	0	0.2
Passenger on Xway	1.9	2	1	1	1	2	0	3.5
Driver on alt. route	17.9	11	22	9	6	29	1	42.5
Passenger on alt. route	1.8	5	0	0	1	1	0	2.3
Other	.5	1	0	0	0	0	0	0.2
I did not change	76.9%							

Because respondents were told to check all categories that applied, totals exceed 100%.

The majority of those surveyed did not change from their previous means of travel. Of the remaining 23.1% who did experiment with alternatives, 17.9% (or 107 respondents) tried driving on alternate routes. The next most popular alternative, rapid transit, had 8.9% of the respondents (53 people) using it. The number of days each alternative was used is presented above.

There seems to have been some confusion on the part of respondents as to what to check if they stayed on the Expressway. It is likely that some respondents checked "Driver on the Expressway" even though they had not changed to driving from some other mode; more likely, this category should be combined with much of the "I did not change" which is an amalgam of respondents in all other categories. It is unlikely that a large number of respondents changed from a transit mode to driving on the Expressway.

The highest preferred alternative, in terms of the number of days it was used, is the option of being a driver on an alternate

route. Of non-driving alternatives, rapid transit followed by express bus, and commuter rail were the experimental modes of choice.

Question H

How did you obtain information on other means of travel?

Public information dissemination seems to have been very effective with 95% of the respondents having received some information on alternative means of travel. For those who received information, it was by the following means:

Information Means	Percent Receiving Information this way
Newspaper	61.0
Radio/TV	53.0
Word of Mouth	28.0
Pamphlet	14.0
Posters	5.8
Community Meeting	2.2
Telephone Information	1.2
Have not heard of other means of travel	4.9

During Reconstruction

Question I-J

What means of travel are you using now? Please give information on the means of travel.

These two questions were designed to obtain detailed information on the mode-shift which could be taking place "during" the reconstruction period. Respondents were first asked to check the means of travel which they were currently using. They were allowed to claim up to three modes. The basic frequencies are summarized as follows:

Mode Choice	Absolute Number	%*
Expressway User	524	88.0
Driver on Alternate Route	120	20.2
Rapid Transit	45	7.5
Express Bus	27	4.5
Commuter Rail	16	2.6
Commuter Boat	13	2.1
Passenger on Alternate Route	9	1.5
Vanpool	6	1.0
Changed Destination	15	2.5
Gave Up Trip	15	2.5

*Will sum to >100% since respondents were permitted more than one choice.

Respondents were then asked to include information on the number of days which they used each mode, the number of days in which trips were given up and any changes in destination which occurred.

Table 12.2 summarizes these results for all respondents who used the Expressway five days or more per week before reconstruction. Of these respondents, only 3.0% of the respondents replied that they no longer made the trip that they were making before reconstruction began.

An anomaly occurs in the results, however, when summarizing the data. Responses were weighted by the number of days used, and 74.1% of respondents claimed to be using the Expressway. CTPS and MDPW ground counts showed a 7.6% reduction in vehicle volumes on the Expressway. Therefore, it appears that the survey respondents may not be an unbiased sample of all Expressway users. This percentage may represent a disproportionately high level of modal shift which occurred early in the reconstruction period and which subsequently returned to previous level of Expressway use. Alternatively, a bias may have existed in those who responded to the survey. It is hypothesized that people who tended to respond to the survey were the same group who have tended to change travel patterns and that the survey, therefore, was a self-selected group.

Based on the assumption that the relative shares among all mode-change percentages are correct and are representative of all individuals who changed modes in response to the reconstruction, an adjustment was made equating 74% (the surveyed level) with vehicle volumes of 92.4% (the recorded level). The resulting adjustment is also included in Table 12.1.

Question K

If you are travelling by car, how many people are in the car including yourself?

This question, designed to test the auto occupancy of vehicles after the start of reconstruction, received the following response:

Drive alone	67.1%
Driver + 1	19.6%
Driver + 2	4.8%
Driver + 3	2.4%
Driver + 4	.6%
Driver + 5 or more	.7%

This distribution results in an auto occupancy rate of 1.485.

Means of Travel During Reconstruction	# Responses by Days per Week Making Trips							Total Weighted Days	Mode Choice Percent	Adjusted Mode Choice
	1	2	3	4	5	6	7			
SE Expressway	23	21	24	28	224	23	3	1528	74.10	92.40
Alternate Routes	16	8	6	3	39	2	1	276	13.39	3.93
Express Bus	1	2	3	3	8	-	-	66	3.20	0.94
Rapid Transit	4	5	1	-	6	-	-	47	2.28	0.67
Vanpool	-	-	-	1	6	-	-	34	1.65	0.48
Commuter Rail	-	-	-	3	3	-	-	27	1.31	0.38
Commuter Boat	2	-	-	2	2	-	-	20	0.97	0.28
Other	2	-	-	-	-	-	-	2	0.10	0.03
Not making trips	-	-	-	-	-	-	-	62	3.01	0.88
Total								2062	100.00	100.00

Note: Based on those who used SE Expressway 5 days or more per week before reconstruction.

TRAVEL MODE CHOICE
"DURING"

CTPS
TABLE
12.2

Question L

If you currently use means of travel other than a car, is a car available for the trip on the Expressway (and you decided not to use it)?

This question was designed to gather information on auto availability for those using various transit modes. Sixty percent of those respondents using means of travel other than cars had automobiles available for their trip.

Question M

Has the reconstruction affected your weekend travel?

Almost 67 percent of the respondents claimed that there was no effect on their weekend travel. For the 33 percent who were affected, the following were the most common comments:

1.	Travel times are worse	28.2%
2.	Travel to Boston is now less often	18.6%
3.	There is poor timing for reversible lanes	15.9%
4.	Generally use Expressway less frequently	4.2%

Question N

Please write any comments you may have on Expressway reconstruction

This request brought the following responses:

o The express lanes are a good idea, keep them!	15.3%
o Good project planning	14.5%
o Weekend travel times are worse, in general	8.9%
o On weekends, I don't use Xway or Alt. Routes now	7.4%
o Travel (time) is better	5.9%
o On weekends, I don't travel to Boston anymore or as often	5.8%
o Improve mass transit	5.7%
o Inadequate methods of dealing w/ emergencies/breakdowns	4.0%
o Fewer accidents, breakdowns than expected/other problems	3.7%
o Travel is easier (driving)	3.0%
o Speed up construction	3.0%
o Bad police operations	2.9%
o Eliminate trucks from express lane	2.5%
o Poor operations of reversible lanes on weekends	2.3%
o Improve capacity	2.3%

12.4 COMPARISON OF BEFORE AND DURING RECONSTRUCTION

12.4.1 Travel Time Changes

The impact of the reconstruction project appears in an overall sense to have maintained the perceived travel times of respondents. For all respondents, both Expressway and transit users, there was the following change in travel time:

Travel time is shorter now than before:	21.8%
Travel time is same as before:	54.3%
Travel time is longer now than before:	22.9%

That is, nearly the same number of respondents have benefited from an improvement in travel time than those respondents who find that their current trip is more time consuming.

12.4.2 Start Time Changes

As displayed in Figure 12.2, the respondents did note some changes in trip start times. The following changes in start times were reported:

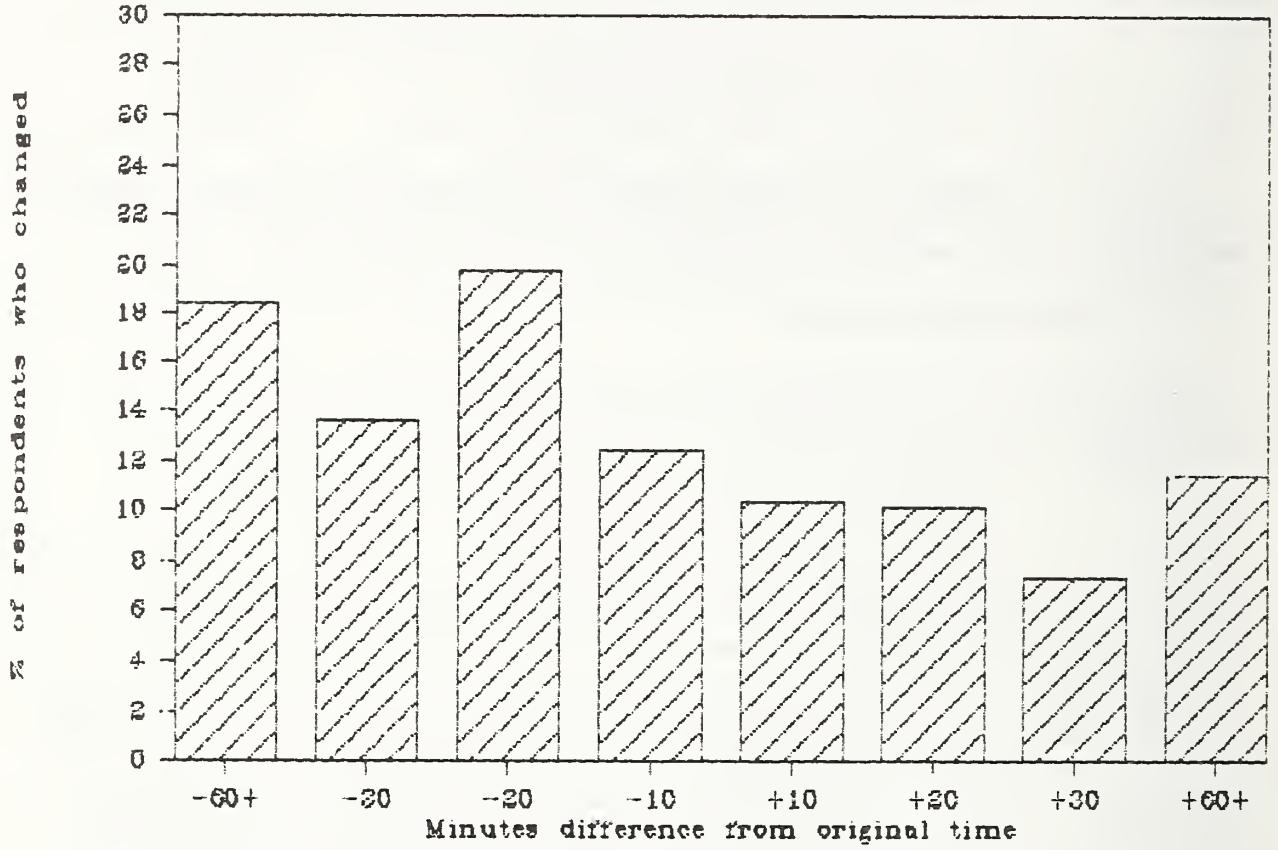
Start time of trip earlier	18%
Start time of trip the same	71%
Start time of trip later	11%

12.4.3 Auto Occupancy

The rate of auto occupancy "before" and "during" reconstruction, as measured by the survey, increased slightly. The survey showed a rate of 1.43 "before the reconstruction and 1.48 "during." Counts conducted independently of the survey showed no significant change in auto occupancy between the "before" and "during" periods. These counts, however, were significant in that they were characteristically lower than the survey response with 1.34 reported in the "before" period and 1.33 in the "during" period. The most likely explanation is that survey respondents are somewhat more involved in ridesharing than most users of that facility and that they tended to be somewhat more prone than average to change their ridesharing behavior.

12.4.4 Comparison of Survey Results with Independent Counts by Mode

There are a number of areas where the results of the survey can be compared with separate counts and observations made in other portions of the Southeast Expressway travel monitoring effort. Figure 12-3 presents a comparison of reported mode choice to field counts. Of greatest interest is the question of modal shift.



START TIME DIFFERENCES FOR RESPONDENTS WHO CHANGED

CTPS FIGURE 12-2

Travel Mode Choice During Reconstruction (for Respondents Previously Using the Expressway)

Alternative Mode Choice	% from survey	Predicted Change in Ridership/Use	Counted Change in Ridership/Use	"BEFORE"	"DURING"	Sources
Alt. Routes	3.93	2747	+ 4000	10/21/83-3/19/84	3/19-end of 5/84	(a)
Express Bus	.94	674	- 31	12/13, 12/20/83, 2/7-8/84	4/25/84	(b)
Rapid Transit	.67	479	+ 450	1/17, 2/29, 3/19, 22, 29	May 16, June 21	(c)
Vanpool	.48	344	+ 266*	Monthly counts 1983	April 1984	(d)
Commuter Rail	.38	272	+ 370	3/7/84	4/10/84	(e)
Commuter Boat	.28	200	+ 100	1/1-mid March 1984**	3/26**-4/30/84	(f)
Other Modes	.03	21				
No Longer Making Trip	.88	631				

*Includes only CARAVAN Vanpools.
**See Memo for explanation of comparisons used.

Sources:

(a) Memo to Southeast Expressway Travel Monitoring Files, Efi Pagitsas, "Analysis of Travel Times on the Southeast Expressway and the Alternative Routes, July 3, 1984.

(b) Memo to The Southeast Expressway Reconstruction Travel Monitoring Files, Robert Sievert," Counts of Private Bus Carrier Boardings from Boston to the South Shore Before and During Reconstruction", July 2, 1984.

(c) Memo to The Southeast Expressway, Travel Monitoring Files, Alicia Powell Wilson, "The Effects of Southeast Expressway Reconstruction on Rapid Transit Ridership in the South Shore Corridor, July 25, 1984.

(d) Memo to Southeast Expressway Reconstruction Travel Monitoring Files, Robert Sievert, "CARAVAN Vanpool Ridership Between the South Shore and Boston", Sept. 19, 1984.

(e) Memo to Southeast Expressway Before/During/After Files, Thomas J. Humphrey, Analysis of Results of CTPS Commuter Rail Counts, 3/7/84 and 4/10/84.

(f) Memo to Southeast Expressway Reconstruction Travel Monitoring Files, Melissa Laube, "Commuter Boat Ridership Before and During the Initial Phase of Expressway Reconstruction, May 29, 1984.

ALTERNATIVE MODE CHOICES FROM USERS SURVEY COMPARED WITH COUNTS

CTPS

FIGURE 12-3

Questions I and J identified respondents who had used the Expressway and then shifted to other modes. Table 12.2 displays the percentages of shift and a factoring procedure which converts the total number of "before" Expressway vehicle volumes expected person trips in the following way:

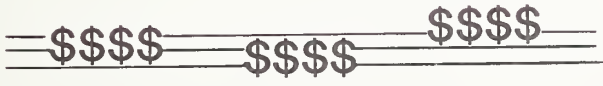
61,575 ("Before" Total Volume) *
.86 (autos in fleet mix) = 52,955 autos

52,955 autos * 1.32 (persons/auto, measured) = 69,900 person trips

The total number of person trips were then multiplied by the percentages (from the survey) to find the expected changes in ridership on various transit modes. These predicted ridership changes were then compared to the changes found in the series of ridership counts.

In general, the results are within a reasonable range of variation around the count values. One difference of consequence is the predicted value for the number of express bus riders. From the survey results, we might count approximately 674 new riders, whereas in the ridership counts, a decrease of 31 riders resulted. A second substantial difference was in the anticipated number of drivers who switched to alternate routes. Far more drivers are actually using these alternative routes than the survey respondents indicated. Apart from these two dissimilarities, survey respondents tended to provide a fairly characteristic picture of conditions for all Expressway users as corroborated by other phases of the study.

13. Program Costs



CHAPTER 13: PROGRAM COSTS

The corridor traffic management plan implemented during the Southeast Expressway reconstruction consisted of two parts: actions taken to mitigate disruption within the project site and actions taken to facilitate "off-site" travel. The costs for project site measures are listed by line item in Table 13.1.

With daily volumes ranging as high as 160,000 vehicles per day on the Expressway facility, the project had the potential for excessive commuter delay costs. Thus, completion date compliance was of significant importance to this contract. Recognizing this, the MDPW incorporated a $10,000 per day incentive/ disincentive clause into the contract to encourage compliance with the scheduled completion date. Although the project work was completed close to schedule, the impact of the incentive/ disincentive clause is unclear. The contractor has stated that the clause had little influence on his work schedule. The MDPW Commissioner, however, has stated that the clause did create a noticeable incentive to finish the job ontime.

The costs for "off-site" actions are shown in Table 13.2. As part of the project planning for these alternatives, the MDPW presented a proposal to the FHWA seeking additional federal funding under the Interstate 4-R program. The FHWA authorized matching funds for those program items indicated in the second column of the Table.

The state's fringe parking program is generally funded through a state-aid program. Because the new construction and expansion work required some time to design, federal funds were not sought because of possible delays caused by federal review. Similarly, CARAVAN existed before the reconstruction and had previously been funded through a combination of federal and state sources. The budget increase during the reconstruction was easily accomplished by a new contract.

Intrinsic to the MDPW strategy was the flexibility to reduce funding for those actions where continued funding proved unwarranted. Funding cutbacks were made to:

- o Alternate Routes - Police details eliminated.
- o Public Information - Second year activities diminished.
- o Aid to Affected Communities - Police details and second year programs curtailed.

	ACTUAL
TRAFFIC POLICE	$ 4,600,000.00
TOW TRUCKS	1,700,000.00
COMMUNICATIONS	150,000.00
TEMP. MEDIAN BARRIERS (COST)	1,100,000.00
TEMP. MEDIAN BARRIERS- (Place, Rem. & Res. & Stack, etc.)	1,750,000.00
PADDLE SCREENS	560,000.00
TEMP. IMPACT ATTENUATORS	379,000.00
INCENTIVE/DISINCENTIVE	- (20,000.00)
	$10,219,000.00

CONTRACTUAL COSTS FOR TRAFFIC RELATED ITEMS

CTPS

TABLE 13.1

MEASURES	ACTUAL PROGRAM EXPENDITURES THROUGH NOVEMBER 19, 1985	FEDERAL AUTHORIZATION
Fringe Parking	$1,007,000	0
Vanpool*	$ 175,000	$ 131,250
Alternate Routes	$ 200,000	$ 247,000
Public Information**	$ 165,000	$ 363,000
Aid to Affected Communities	$ 202,000	0
BAT Feeder Bus Service***	$ 385,000	$ 385,000
MBTA Commuter Rail	$3,584,000	$2,564,000
MBTA Private Bus Service	$1,065,000	0
MBTA Commuter Boat	$ 988,000	0
MBTA Red Line and Feeder Bus Service	$ 616,000	0
TOTAL	$8,387,000	$3,690,250

*The vanpool estimate and expenditure does not include the $438,000 of the MDPW two year contract with CARAVAN Inc., to concentrate its efforts Southeast of Boston and provide ridesharing brokerage services.

**Only incurred by the MDPW, does not refer to modal agency expenditures on this item including CARAVAN, MBTA, etc.

***The Brockton Area Transit Authority provided express bus service from the city of Brockton to the MBTA Red Line rapid transit service during reconstruction.

COST OF SOUTHEAST EXPRESSWAY TRAVEL ALTERNATIVES PROVIDED DURING RECONSTRUCTION

CTPS TABLE 13.2

o MBTA Private Bus - Additional departures cut back.

These cutbacks permitted officials to shift funding to other strategies which had proved more expensive. Overall, the state spent more than had been initially expected under contractual obligations and slightly less than initially anticipated on the package of measures to promote use of Expressway alternatives.

The addition of park and ride spaces proved to be the most cost-effective action, costing approximately $3.15 per person trip captured. Obviously, the benefits of additional spaces and new lots did not end with the completion of project work and the long-term cost-effectiveness of this action will continue to improve over time. The $3.15 value represents the cost per new user served over the 18 month work period.

The least cost-effective investment made in Expressway travel alternatives was the subsidy of private bus operations. A meaningful ratio of cost per passenger trip is not possible due to the slight reduction in ridership reported during reconstruction. As mentioned previously, state subsidies were maintained throughout the reconstruction for the operation of services carrying a minimum of 15 passengers and/or where other alternatives were unavailable.

Among the remaining alternatives, feeder bus and the operational improvements made by the MBTA to rapid transit service proved nearly as effective as the park and ride program costing $4.64 per person served. Following this was the initiation of express-feeder bus service by the Brockton Area Transit Authority which operated between Brockton and the MBTA rapid transit line and required a per passenger-trip subsidy of $4.86. Less cost-effective were expenditures on commuter rail and commuter boat service which cost $11.46 and $13.86 respectively, per passenger trip. However, it should be noted, that subsidy per passenger is generally expected to be higher for these services as opposed to other public transit such as bus service, due to the greater capital and operating expenditures that are necessary.

14. Conclusions

CHAPTER 14: CONCLUSIONS AND RECOMMENDATIONS

14.1 TRAFFIC VOLUME CONCLUSIONS

The traffic management plan provided the Southeast Expressway with additional capacity in the peak direction during peak hours. Capacity and safety improvements were also made on the MDPW designated alternate routes. Public information efforts encouraged Expressway auto-users to seek alternate routes during the reconstruction and to avoid Expressway use whenever possible.

Prior to the reconstruction, peak-period traffic in the peak direction consistently reached the physical carrying capacity of the road. The additional capacity made available by the reconstruction configuration escalated the vehicle service rate, better meeting existing demands and permitting peak hour volumes to rise. During the second year peak volumes again began to approach service volume capacity and travel times lengthened in response.

Despite the increased volume of morning peak traffic, the 13-hour (6:00 AM - 7:00 PM) Expressway volume had declined following the start of reconstruction. During the second year, morning and evening peak volumes grew, but the morning peak continued to exceed evening volumes. A reduction of mid-day trips caused an inversion of the typical pre-reconstruction relationship between morning and evening peak volumes.

The reasons for the diversion of mid-day trips are not readily apparent in the information collected as part of the traffic monitoring effort. However, a number of findings were made which support the probability that discretionary Expressway travel was limited by the traffic management program:

- -Work trip travel on the Expressway continued at or above pre-reconstruction levels throughout reconstruction as seen in the comparisons of northbound before and during peak volumes.

- -Peak period traffic volume changes on alternate routes were consistent between morning and evening periods, indicating changes in work trip patterns only.

- -Public transit improvements were generally geared to better peak period service and therefore had little effect on mid-day general purpose users.

-The public information program discouraged discretionary use of the facility.

-Mid-day users were confronted with the additional uncertainty of the effects which express lane reversal might have on Expressway trips.

-Discretionary trips such as shopping, social and to a lesser extent medical and personal business, can be satisfied by alternate destinations.

It is therefore plausible, that the reductions in mid-day and evening peak travel apparent on the facility stemmed from an absence of discretionary mid-day trips. This discretionary travel, moreover, appears to have been eliminated from the corridor and diverted from downtown Boston to suburban destinations.

During the second year of reconstruction, Expressway volumes increased overall, and consistently between morning and evening peak periods. As a result, the relationship between morning and evening peak volume held as morning volumes continued to be more concentrated than the evening totals.

14.2 TRAVEL TIME CONCLUSIONS

The improved level of service (as measured by travel time) achieved in the first year of reconstruction was due to traffic management methods and not traffic volume reductions. Peak period travel demands increased somewhat while traffic operations improved in response to the express lane configuration. Second year travel time increases occurred in conjunction with increases in peak period volumes that again approached service volume capacity. First year travel time improvements were realized on the five major alternate routes in response to traffic management measures implemented by the MDPW in anticipation of the traffic diversions.

Alternate route and Expressway peak period travel time changes were consistent. Morning travel times generally increased regardless of the route examined. However, evening times were stable on the alternate routes, but were significantly higher on the Expressway. While second year alternate route times are less reliable because of the small number of samples, the findings suggest a greater presence of auto-oriented work trips in the morning which selected the Expressway for the return evening commute.

The peak period, off peak direction travel time increases were as expected since effective capacity was reduced from three lanes to two during the reconstruction.

14.3 MASS TRANSPORTATION CONCLUSIONS

Travel time/capacity improvements during the morning peak hours kept operational improvements on feeder bus and rapid transit services from successfully capturing market share during the first year of reconstruction. Inasmuch as passenger counts at stations other than Braintree and Quincy Center were relatively stable between the first and second year, it is probable that reconstruction activity influenced ridership differences. The existence of a "second phase" propensity to use rapid transit was likely as much a response to the return of pre-reconstruction travel conditions on the Expressway as to the parking space available at the recently opened Quincy Adams Station.

With regard to park-and-ride lots, lot usage grew in response to the greater capacities and increased opportunities available at designated sites for bus, vanpool and carpool staging. This caused a shift to designated sites from ad hoc sites in addition to attracting first time users.

Hingham-Boston commuter boat ridership increases coinciding with Expressway reconstruction peaked at 90 during the second week after reconstruction began. Second-year ridership levels exceeded those for the first year and before conditions by over 300 passengers for three reasons: (1) significant expansion of commuter boat services, (2) seasonal variation in ridership (higher in spring and summer), and (3) sizeable latent demand for a high-quality boat alternative.

Despite the net addition of more than one dozen buses, bus ridership decreased overall by about 1%. Individual routes of individual carriers experienced gains and losses ranging from +27% to -38%.

A variety of possibilities are cited for these varied trends toward declining ridership:

- Improvements made on other high occupancy modes may have attracted express bus users.
- Ridership gains on certain routes may have been from auto user diversions.
- Daily and seasonal variations contributed to the mixed results.
- The single day ridership survey initially made may have been insufficient.

Actions such as physical upgrading of rolling stocks, and preferential lane treatments are recommended to ensure successful express bus strategies in other areas.

The commuter rail service improvements reached the intended market (drive alone Expressway users) and captured new permanent users. The ability to improve peak period frequency by 100 percent in a corridor already served by two commuter rail lines and under conditions where Expressway disruptions were a persistent threat made commuter rail a particularly good public transit option in this case.

In fact, the improved commuter rail service captured the greatest number of new users among the public transit alternatives, with an absolute increase of between 360 and 420 per day.

Finally, available data from the first year do not show any sizeable growth in the number of vanpools and vanpool ridership above normal levels during periods of since reconstruction. Perhaps anticipating the reconstruction, five new vanpools formed in November and December of 1983 and actually received their vehicles in March 1984. During the second year, a total of 11 new vanpools were formed in the impacted area, serving 154 new riders. This growth was about what was expected without the project's impacts.

14.4 DEVELOPMENT OF A CORRIDOR TRAFFIC MANAGEMENT PLAN

In the initial planning stages, approximately one year before the start of reconstruction, two objectives were developed to guide the organization of a "Traffic Management Plan." Several countervailing concerns were taken into consideration in arriving at these objectives. As is the case in most major reconstruction projects, the agency and communities involved in the Southeast Expressway reconstruction had conflicting interests. The MDPW was interested in completing the project as soon as possible, which meant that use of the facility would have to be restricted. Such restrictions meant the diversion of traffic elsewhere, a diversion that could create significant problems in adjacent communities unless steps were taken to mitigate the impact. For their part, the communities supported this view in accordance with their primary interest of limiting construction impacts.

Based on the experience of the Southeast Expressway project, several characteristics of an effective corridor traffic management plan merit some attention.

Flexibility

The flexibility to withdraw subsidies from unsuccessful measures and focus on more promising actions was key to the overall success of the program. By adjusting resource deployment the MDPW was able to tailor its program according to user response and incorporate other actions to address unforeseen needs. Local officials who became aware of the MDPW's responsiveness to their suggestions were more willing to monitor activity and cooperate with the state's effort.

One example of the program's built-in flexibility was the private bus company contracts. All new subsidy service was contracted for intervals of three months. Contracts were renewed pending performance evaluation. Of the 38 bus departures initially subsidized, 23 were discontinued after the first three-month contract. Another example of this flexibility was the staged implementation of police enforcement.

Public Information

Program implementation depended heavily on the publicizing of available options. In addition, public and media feedback was considered crucial to adjusting the program to meet local concerns. The public information program included: newletters, community meetings, television and radio announcements, newspaper supplements, 100,000 brochures, utility bill supplements, and a telephone bill supplement.

Three professionals were hired to conduct community liaison before and during the project. Their responsibilities included delivering information to the public and providing feedback to project engineers. Critical to the dissemination of public information was the day-to-day project coverage by the local media. Three major local newspapers published supplements outlining alternatives to Expressway travel. Special efforts were made to explain the project to editorial boards of local newspapers which generated a series of editorials supporting the project and urging commuters to seek alternatives.

Interagency Coordination

To ensure interagency coordination, a task force was established to meet periodically and discuss problems. The task force coordinated efforts with the MBTA, State Police, Metropolitan District Police, the regional ridesharing agency, port authority, turnpike authority and 15 municipalities affected by the reconstruction.

Providing and Collecting Technical Information

Up-to-date information was required by decision-makers who were responsible for assessing traveler response to the program and who had to decide what to do next. The information required included data on traffic volumes, transit ridership, vehicle occupancy, accidents and travel time. To collect the data and present it in a timely manner, a comprehensive monitoring program was set up. The information developed was used throughout the project to track and evaluate the performance of the Expressway alternatives.

Planning and Analysis

The planning effort which preceded reconstruction relied on simplified analysis methods and traditional highway capacity

techniques to predict commuter response. Demand estimation techniques were not used. Comparative assessments were made during the process using techniques developed to permit a quick response to changing conditions. On this basis, decision makers adjusted strategies as the commuter response to the project stabilized.

In summary, this project illustrated several important characteristics of a successful strategy to minimize disruption during major reconstruction projects. The responsible agency must clearly identify objectives, strategies, and implementation policies which are realistic and satisfactory to the agency and communities involved. The plan must be flexible in its implementation to allow the removal of ineffective actions in a timely manner. In addition, an institutional mechanism for coordinating the actions of numerous agencies must be established. With regard to information, a program of data collection is needed to provide the information necessary to modify strategies and to answer questions that will surely arise from affected communities and the media. Perhaps most importantly, a comprehensive community relations/media program is essential to the success of any program to minimize disruption.

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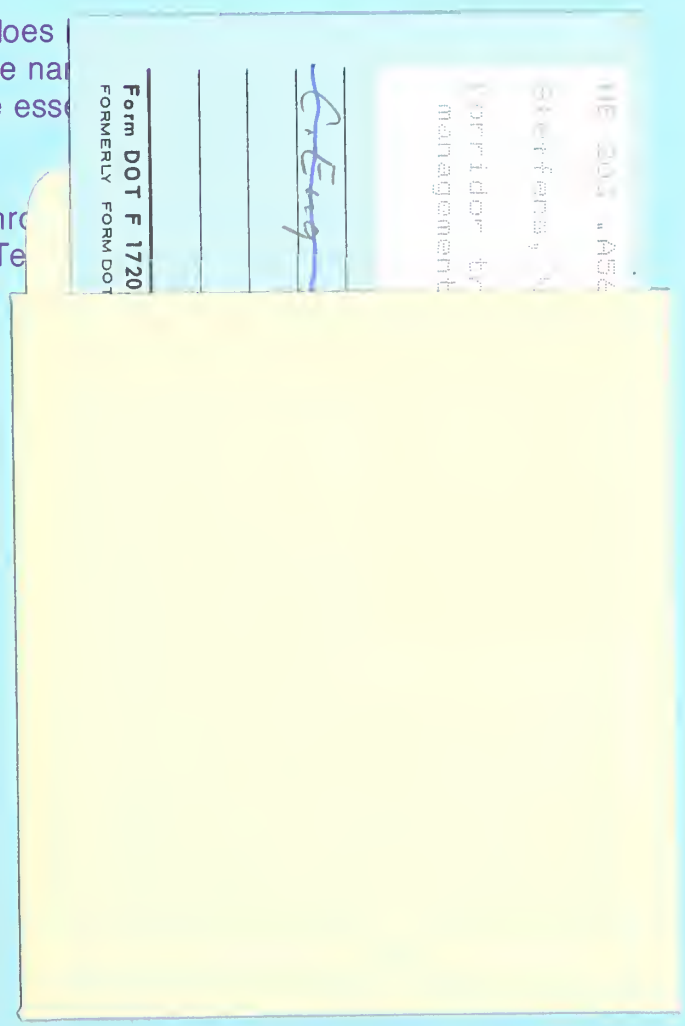

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